GEN
DEC 21 1918
494 2

THE HEATING AND VENTILATING MAGAZINE

A MONTHLY JOURNAL OF ENGINEERING PROGRESS

Vol. XV. No. 12
$1.00 a year. 10 cents a copy

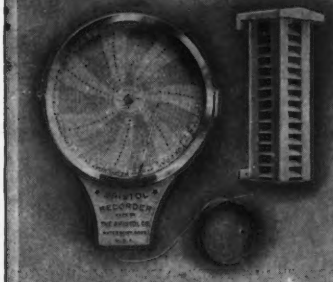
DECEMBER, 1918

Published at Cooperstown, N. Y.
New York Office, 1123 Broadway

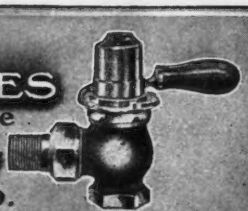
GURNEY HEATERS
FOR HEATING ANY DESCRIPTION OF BUILDING BY STEAM OR HOT WATER
GURNEY HEATER MANUFACTURING CO.
NEW YORK OFFICE 11 E. 42ND ST. 188-200 FRANKLIN ST. BOSTON.

MASON REDUCING VALVES
and other PRESSURE REGULATORS
for all conditions of service
MASON REGULATOR CO., 15 Medway St. Boston Mass.
TRADE MASON MARK MASON

DAVIS VALVE SPECIALTIES
STEAM SAVERS SINCE 1875
PRESSURE REGULATORS, BACK PRESSURE VALVES, EXHAUST RELIEF VALVES, STOP AND CHECK VALVES, FLOAT VALVES, BALANCED VALVES, STEAM TRAPS AND OTHER VALVE SPECIALTIES FOR HEATING PLANTS
SEND FOR LATEST CATALOG
G. M. DAVIS REGULATOR CO.
436 MILWAUKEE AVE., CHICAGO

ATMOSPHERIC TEMPERATURES
Accurately Recorded
Continuous records of outdoor temperatures guide the operation of heating and ventilating systems. The sensitive bulb of a

RECORDING THERMOMETER
Enclosed in a lattice box is installed out-of-doors and the recording instrument inside where it is readily referred to.
Write for Bulletin T-204
THE BRISTOL COMPANY Waterbury Conn.

ROSS FEED-WATER FILTERS
Will Keep Oil Out of Your Boiler
Regulating Valves for Water, Steam, Air
Ross Valve Mfg. Co. Troy, N. Y.
Ask for List of Users

PACKLESS RADIATOR VALVES
Insures Satisfaction. A Valve for every System. Write for Catalogue and Discounts
THE DOLE VALVE COMPANY
208 NORTH FIFTH AVENUE CHICAGO.


Entered as second-class matter at the Post-Office in Cooperstown, N. Y.

Copyright 1918. by Heating and Ventilating Magazine Co.

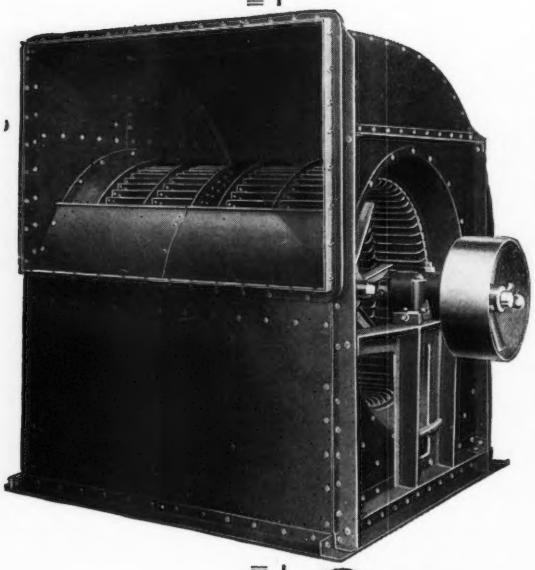
A Well Made Fan With a Perfect Bearing

Choosing a well made fan, one which will give complete satisfaction through years of the hardest service, is important. Choosing a fan equipped with a bearing which will protect it at the one point where friction occurs, is vital. Without such protection, even the finest workmanship is not worth having.

CLARAGE
KALAMAZOO

Multiblade Fans

are the one practical solution for both problems.



Clarage Special Bearings, an absolute protection against dust, grit, and therefore, wear, enables you to capitalize the high grade materials and workmanship incorporated in these Multiblade Fans.

Study the illustration. This bearing, with its special construction, and the felt washer protection it receives, is beyond the reach of the finest dust particles, no matter how hard and sharp. The same construction which keeps grit out, keeps oil in.

These are important facts described briefly. They merit further investigation. Write today for more information.

CLARAGE FAN COMPANY.
KALAMAZOO—MICHIGAN—U. S. A.
NEW YORK CLEVELAND CHICAGO BOSTON

THE HEATING AND VENTILATING MAGAZINE

Cooperstown, N. Y. December, 1918 1123 Broadway, New York

AIR SUPPLY FOR A LARGE GENERAL OFFICE BUILDING

Past and Present Practice Illustrated in Remarkable System Installed for Swift & Co., Chicago

By SAMUEL R. LEWIS

A better understanding of the plant and the reasons for an unusual design will be gained by a brief description of the old plant which cared for the original building.

The general office building of Swift & Company, as it existed prior to the summer of 1917, was five stories high, about 200 ft. long and 94 ft. wide. It was equipped with an indirect system of heating, using live steam, with electric power. Fresh air was taken through the sides of a roof pent house, drawn through tempering heaters in

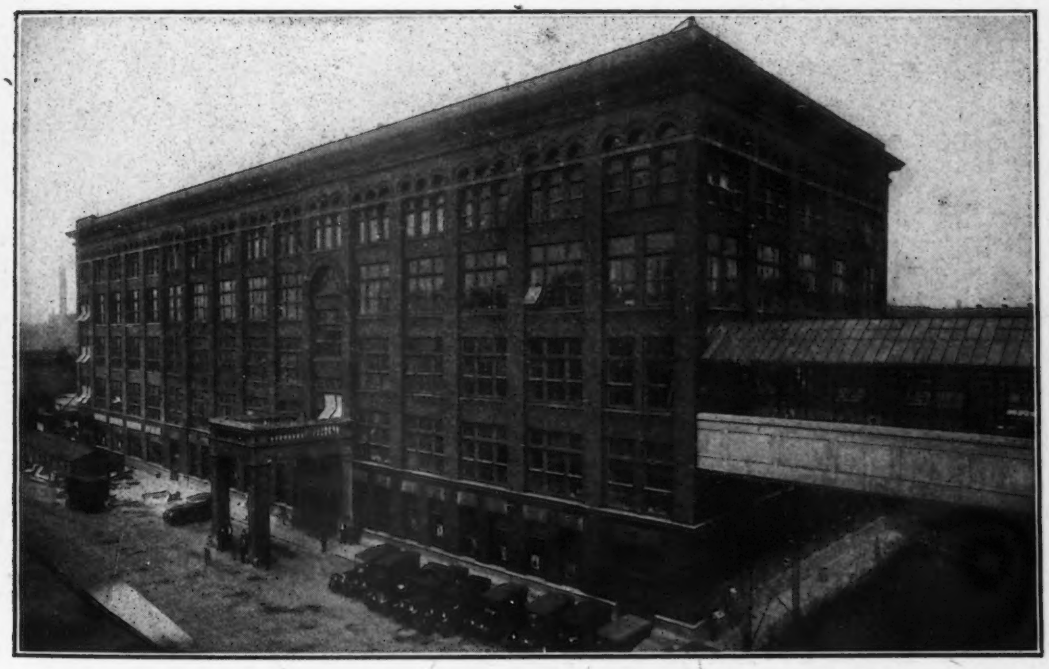


FIG. 1.—GENERAL OFFICE BUILDING, SWIFT & CO., CHICAGO.
The original building comprised the eleven southerly panels, the five panels to the extreme left are the addition. The covered bridge on the right is a private connection with the elevated station.

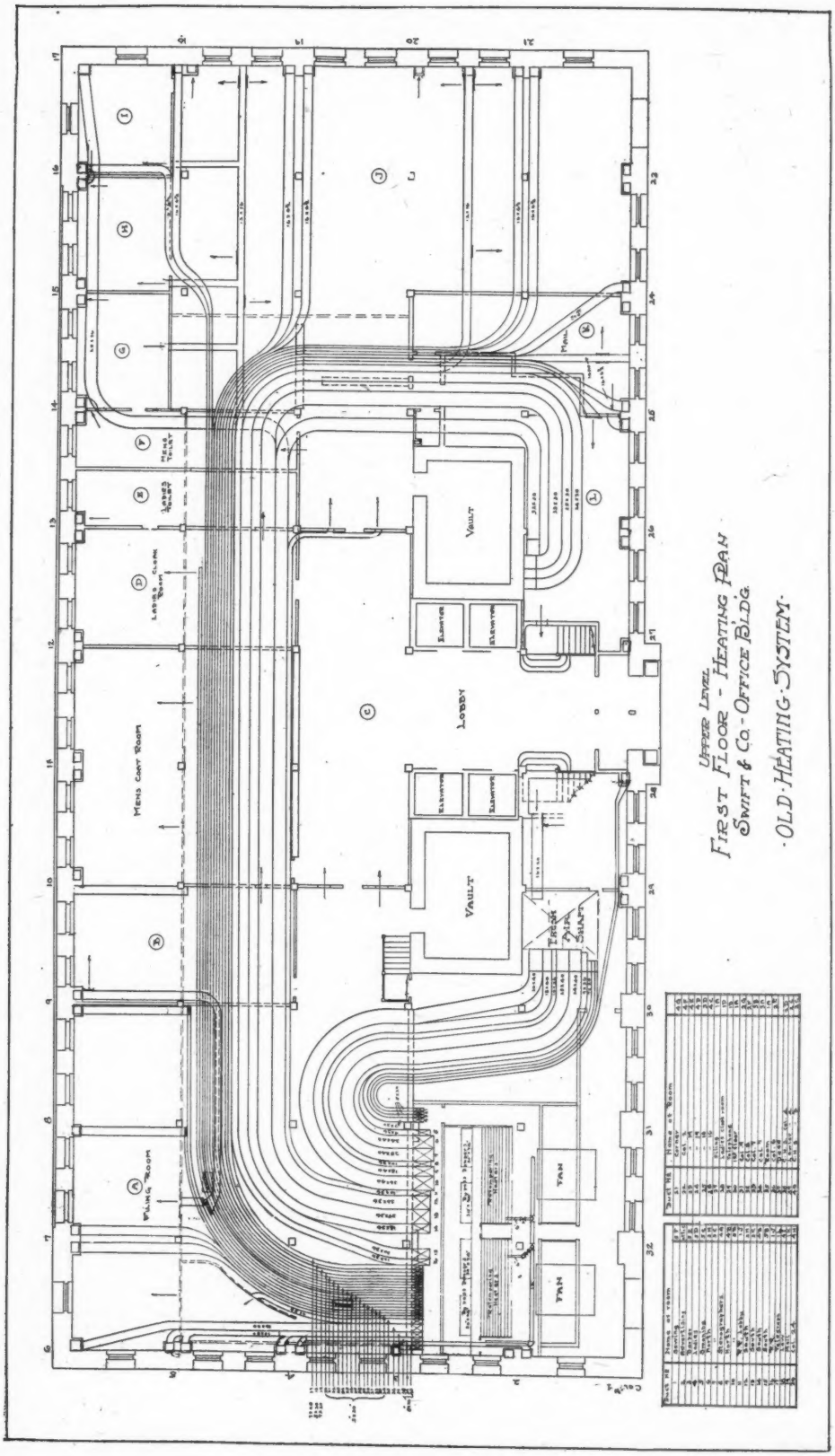


FIG. 2.—FIRST FLOOR PLAN OF THE OLD VENTILATING SYSTEM.

The fresh air passed from the intake shaft over the elevator machinery and through the air washers in a pit under the retempering heaters, then to the four inlets to the two supply fans. Leaving the fans, it was delivered through the ceiling ducts, the size and extent of which may be partially realized from the drawing.

the attic, then down a tortuous and constricted passage to the basement.

Here, as originally designed (Fig. 2), the fans delivered it through reheaters into a large hot air plenum chamber, or by-passed it under the reheaters to adjacent tempered air plenum chamber. From these pressure rooms, which were located in the northwest corner of the basement, as shown on the drawing, a separate metal duct conveyed the air to the bottom of each vertical flue. In general there were two supply flues to each story, and these were located symmetrically near the center of the building, serving the general open spaces. There were, however, a number of private offices, and separate flues to supply these ran up the outside walls. Each separate duct had a mixing damper at the plenum chamber in the basement controlled by a thermostat in each room. The ducts in some cases were over 200 ft. long, only 5 in. wide, and 20 in. deep. They were concealed above the first story ceiling.

DEFECTS OF PREVIOUS SYSTEM.

There was no direct radiation anywhere in the building, except in the front entrance. The toilet rooms had no heating or ventilating facilities whatever; such air and warmth as they gained leaked in through the doors.

The delivery of fresh air in the general offices on the second, third and fourth floors was near the ceiling from an interior wall toward the windows. The exhaust arrangements consisted of tile-lined vent flues about 10 in. x 16 in. inside, against the outside walls. The total cross-sectional area of the vent flues in any rooms was usually very much less than the area of the supply flues, and the aggregate area of all of the facilities available for air removal was far less than that which experience has proven necessary. The fresh air tended to pass from the high-up interior supply openings over the heads and above the breathing zone level of the occupants, to the cool outside walls and glass. Here it would fall toward the floor, passing directly out through the vent openings, chilling the unfortunate people adjacent to such openings and resulting in the openings, despite strenuous efforts to prevent it, being closed every cold morning. The center of the room, in the meantime, received practically none of the entering fresh air.

NECESSITY FOR CLEANING AND COOLING AIR.

As the company grew and the intensity of occupation mounted, it became apparent that in order to maintain efficiency some means of cleaning and cooling the air must be provided. Accordingly a space under the plenum chamber was excavated and the fresh air en route from the tempering heaters to the fan was passed through a water spray, then through a cast-iron eliminator. This old washer, due especially to the high air velocity through it and the inefficient eliminator, was unsatisfactory either as a cleaner or as a remover of entrained water. A concrete tank was excavated for, below the floor, and this tank was filled with brine coils which were entirely submerged in the circulating water. As a cooler, due to practically unlimited refrigeration, the old plant was competent.

The first floor was originally intended to be used for storage purposes, and the ventilation of the crowded rooms installed here as a makeshift was most unsatisfactory. There were no adequate supply ducts, no vent flues, and the principal ventilation of this floor was via the stair hall to the attic. The fifth floor was designed as a dining-room with ceiling inlets and outlets alternating around the various chandeliers. All supply ducts for the fifth floor were run through an attic space between the trusses, about 5 ft. high, under a flat concrete roof. This attic gets very cold in winter, and extremely hot in summer. Although the

old attic ducts were insulated, the losses were considerable, especially in winter, when the entire heating was done by air which, after being warmed, had traveled in some cases as far as 600 ft. through narrow metal ducts.

All windows were double, this being necessary to prevent frosting in winter and undue losses in summer, but the entrance doors were leaky and of the swing type. Consequently, when cooling, the conditioned air, being much heavier than the warm outside air, fell down the stairs and ran out of the doors acting like so much water. All condensation from the heating system was wasted to the sewer. The long exposure of adjacent, very narrow and deep metal ducts to each other made temparature control of distant rooms very difficult.

EXPOSED STEEL AT STOCKYARDS SUBJECT TO RAPID CORROSION.

Some substance in the air at the stockyards, popularly believed to emanate from sulphuric acid processes, causes very rapid corrosion of all exposed steel. Ordinary black steel pipe heaters and even galvanized steel sheets have a very short life. The old tempering heaters had been renewed several times, and the fan housings had been patched repeatedly to cover holes caused by corrosion. The air is also heavily charged with dust and soot. The old air-ways, with their long, horizontal runs of inaccesible space, were thoroughly coated with this matter. which could not be reached, but which accumulated year by year.

HOW DUST IN AIR DUCTS NULLIFIES WORK OF AIR WASHER.

In this connection it is interesting to observe that while careful tests of very efficient air washers show that they may and do reduce the bacteria content very materially, samples taken from points in duct systems only slightly distant show large numbers of colonies. Conditions in air ducts as to moisture and temperature are favorable to the development of bacteria, and we draw the conclusions that the nearly sterile air from the washer is rapidly impregnated with spores from the air-way surfaces and that we would do well to have these surfaces accessible, and to see that they are cleaned frequently.

ENTIRELY NEW SYSTEM DESIGNED FOR ENLARGED BUILDING

It was decided by Swift & Company in 1917, to increase the size of the building about 50%, adding five stories on the north end, about 90 ft. by 94 ft. in area.

The considerations mentioned in connection with the old ventilating plant—that it was overloaded, and that it occupied valuable and well-lighted space on the first floor—made it desirable to install an entirely new system for the entire building.

During the winter of 1916-17, fortunately, we had made an investigation and report on the old system and so were familiar with all of its details. In designing the new plant, some of the vital considerations were:

1. The plant must be efficient as a cooling system as well as for heating, since the large floor areas in proportion to outside wall heavy percentage of occupancy and extensive use of electric lights render cooling in warm weather imperative.
2. There must be control of humidity at all times, whether heating or cooling.
3. The maximum of accessibility to all parts for cleaning must be provided, since the plant runs 24 hours per day, the year round.
4. A minimum use of steel in any form must be achieved, to avoid the heavy maintenance expense due to corrosion.
5. Exhaust steam, an ample quantity of which is available, must be used for heating, rather than live steam.
6. The ventilation of the toilets and wardrobes must be positive.

7. All plumbing must be protected by adequate radiation to prevent freezing when the fan sytem, for any reason, is shut down.

8. Since there is to be a dining-room on the fifth floor and a cafeteria on the first floor, care must be used to prevent any odors of food in the offices.

9. There are not only large general offices, but also, around them, on the outside walls, many private offices and the location and size of these private offices will inevitably from time to time be changed. It is necessary to provide separate heating, cooling, ventilation and temperature control of these offices, arranged so flexible as to permit of changes being made at any future date, and when such changes are made the conditions must be equally good in all offices, old and new.

10. The plant must be designed so that the fresh air sweeps all of the floor area, with reasonably even speed, and so that even though private offices extend around a large percentage of the exterior walls, cutting off the vent flues, the general offices shall not suffer thereby.

11. The plant must be designed so that the continuous operation of the building shall not be interfered with while the new plant is being installed, and so that service shall be furnished by one or the other plant at all times during the reconstruction.

LOOP CIRCUITS FOR THE AIR PROVIDED FOR IN GENERAL SCHEME.

The best ventilation we know of is obtained by a current of comfortably heated and moistened air sweeping like a breeze across the bodies of the occupants. Structural limitations and physical conditions of local heating and cooling which would disturb such a current render its use on any grand scale impracticable in this building. In rooms having fixed seats we can simulate this desirable condition by using floor inlets, as in theatres and churches. Here, however, absolute flexibility of furniture locations is imperative. The modified system of cross ventilation of the old plant has been proven unsatisfactory, as we found certain places in the large rooms, near the center, with carbon dioxide content as high as 17 parts per 10,000, showing that practically none of the entering air reached these spots. We, therefore, adopted a general scheme of loop circuits for the air, with inlets usually well above the breathing zone, having a velocity of around 600 lin. ft. per minute, and outlets at both floor and ceiling, the outlets being distributed as far as practicable so as to drain out the air from all parts of every room. Where the outlets cannot be depended upon to do this, the inlets may do so by high velocity jets of air sprayed over the heads of the occupants and reaching the stagnant parts. All inlets, therefore, have adjustable diffusers capable of diverting the air horizontally, and many inlets have horizontal adjustable louvers in addition, for vertical diversion of the air currents. In adjusting the air delivery since putting the plant into commission, we have found these diffusers of remarkable value. Necessarily in so crowded a room there may be conditions affecting a few occupants who must sit very close to vent openings, due to drafts. In such cases opening the vent registers at the ceilings or setting them partly open will settle the problem, without curtailing the general ventilation.

When cooling the room, the heavier chilled air from the inlets falls to the floor, displacing the warmer and contaminated air. At such times the upper outlet openings are most effective in promoting good ventilation.

A considerable supply of air was provided in excess of the capacity of the regular outlet flues, and this excess is used for supply to wardrobes, toilets, etc., also to provide a movement of air from all floors out into the corridors and stair halls, and from these into the dining-room, cafeteria, etc., so as to prevent dissemination of food odors.

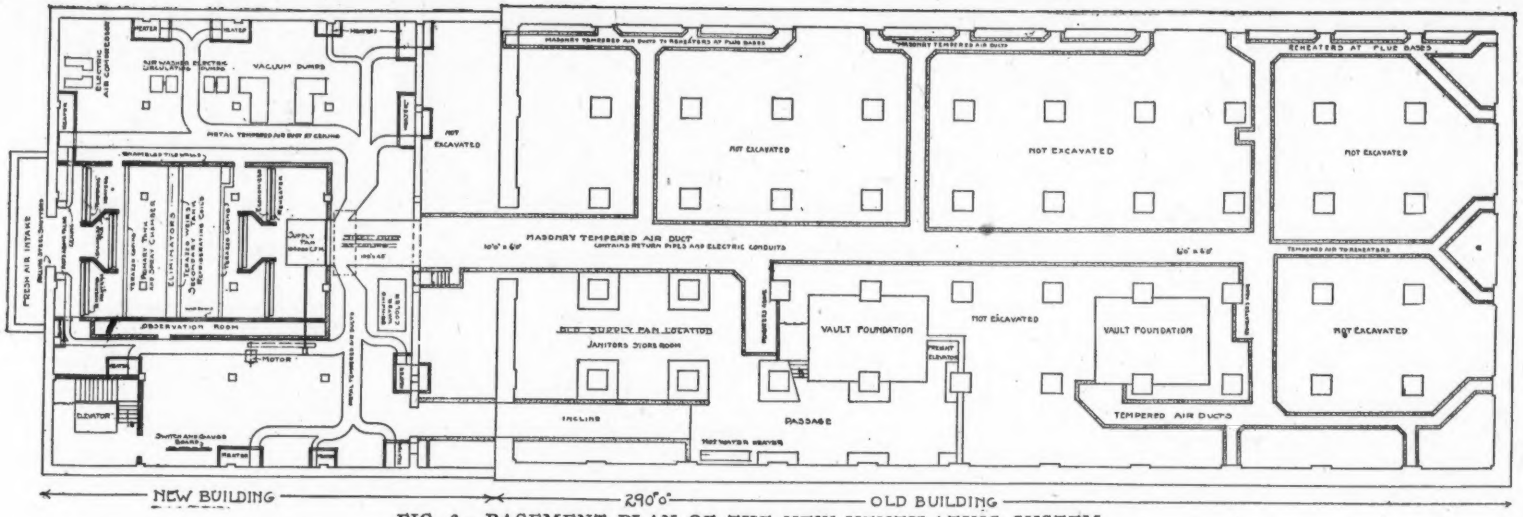


FIG. 3.—BASEMENT PLAN OF THE NEW VENTILATING SYSTEM.

The basement extends under the new part of the building only. Tunnels for airways were excavated under the old part.

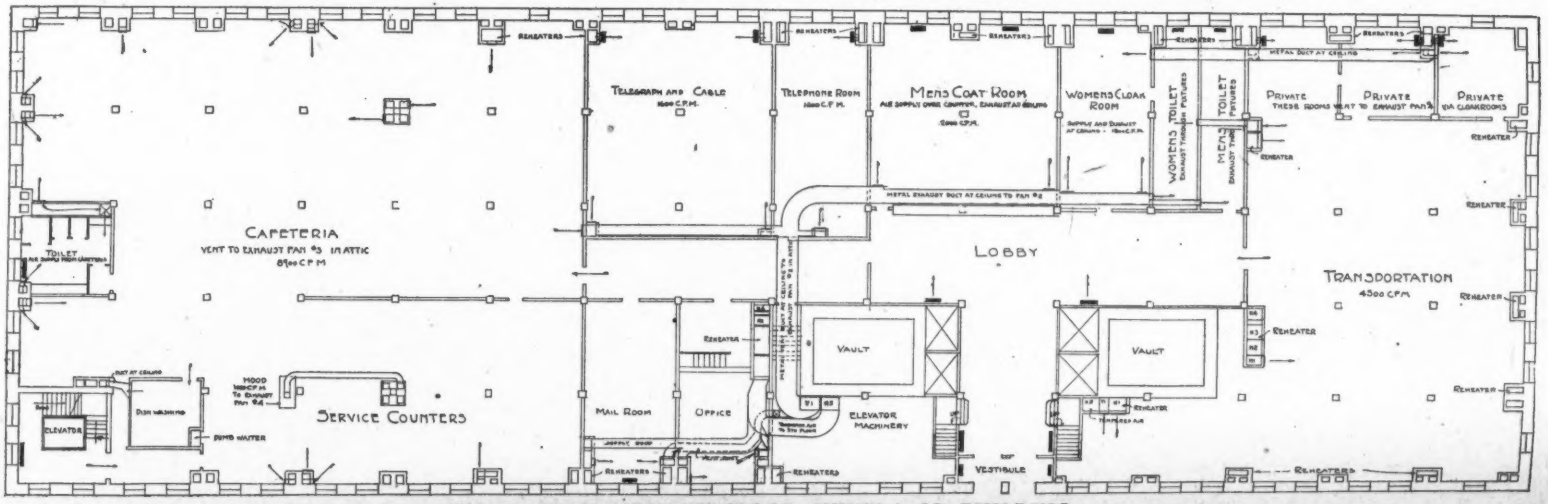


FIG. 5.—PLAN OF FIRST FLOOR, SWIFT & CO. BUILDING.

In the old part at the right will be seen the enlarged flue bases enclosing the reheaters. In the center will be noted the exhaust ducts for toilet, locker rooms, etc.

ARRANGEMENT OF AIR-WAYS IN NEW SYSTEM.

The new tempered air duct runs down the center of the building (Fig. 3) with small branches to the risers, and is in tunnel under the old part, and in metal in the new part, a basement existing under the new part only. All ducts for air supply, however, are large enough for easy passage of a man, and the main air-ways would take an automobile.

Since the air in the main masonry duct is never cooler than about 60° F or warmer than about 66° the year round, there is no special insulation required after once bringing the walls and surrounding ground to this temperature. The metal supply ducts, however, in the basement are heavily insulated; more on account of the objectionable dripping from them than for any other reason. (The ducts are usually much cooler than the warm damp basement.) The metal supply ducts in the attic also are insulated because the attic is very hot in summer and very cold in winter.

FIG. 4.—INTERIOR OF THE MAIN TEMPERED AIR DUCT.

Covered steam pipes and electric conduits will be noted at the ceiling. The pipe at the floor is a vacuum return. The bottoms of all tunnels are well above the basement of the new building, toward which they grade. The tunnels are, therefore, perfectly dry, except when washed out for sanitary reasons.

The main air-ways are provided with lights (Fig. 4) with adequate cleaning facilities, and serve also as conduits for steam, water, compressed air and other pipes, all of which, of course, are properly covered.

By this general scheme in which only the old vertical flues are used by both old and new plants, it was possible to keep the old plant running until the new one was completely installed so far as the new third of the building was concerned (Fig. 5); then to build the new underground work in the old part so that air from both sources was available at every flue; changing a flue at a time from old to new supply system until enough had been changed to permit of the removal of the old apparatus.

The following is a schedule of the fans, which are of the Sturtevant multivane type:

No. 1. Supply, 104,000 C. F. M.

No. 2. Exhaust toilets and lockers, 24,700 C. F. M.

No. 3. Exhaust dining-room and caféteria, 16,300 C. F. M.

No. 4. Exhaust kitchen, 6,000 C. F. M.

In order to economize on floor area, which is extremely valuable, the fresh air intake is from the north and a little above the ground, and all exhaust fans are in the attic—thus there are no down current air-ways, but all passage of air is upward.

HOW THE PRIVATE OFFICES WERE HANDLED.

The problem of the ever changing private offices is cared for by providing at each outside wall panel point in each room:

A. Adequate steam supply and vacuum return risers.

B. Compressed air risers for automatic control.

C. A vent flue which can be tapped as required.

D. A tempered air supply flue which can be tapped as required.

Any private office, therefore, may take from the main tempered air riser (capable of supplying as much as 2000 cu. ft. of air per minute) the 400 cu. ft. likely to be the maxim needed, and may return this air to the corresponding vent flue. An enclosed raidator is provided for each office, which warms the tempered air as needed to maintain the desired temperature, depending on outside conditions (Fig. 6). When a private office is removed, throwing the space into the general office, the separate heating and ventilating arrangements may be removed or not, as convenience dictates.

Experience has shown that when under full occupancy of the general offices (Figs. 7 and 9), with many lights turned on, we must have the tempered air cooled as low as 60° in summer. Such an inlet temperature

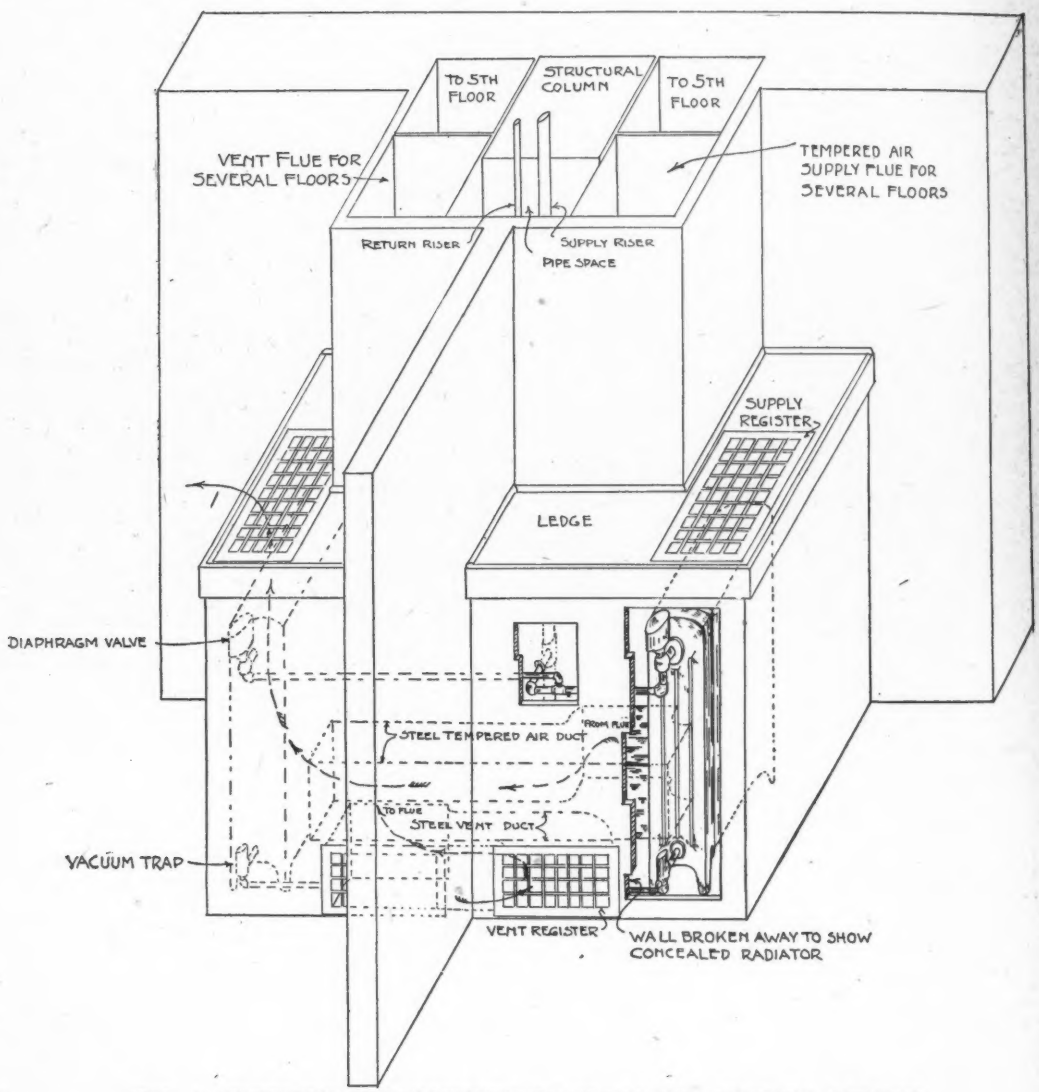


FIG. 6.—FLEXIBLE ARRANGEMENT OF FLUES FOR PRIVATE OFFICES.
In certain locations flues as illustrated are provided, which permit private offices in each panel, at any or all floors, each office to have a radiator, warm or cool air supply, a vent flue and a thermostat.

will not answer at all for the private offices with their limited number of occupants, so it is common practice in this building even in hot weather to have the steam turned on the radiators in the private offices and smaller rooms. There seems no way to avoid the necessity of doing this, especially in the rooms which do not receive the warm sunshine.

The exhaust fans care for the removal of about 46,000 cu. ft. of air per minute, the remainder, 58,000 cu. ft. of air per minute, escaping through roof ventilators from the attic, induced by the pressure generated by the supply fan (Fig. 10).

FIG 7.—VIEW IN GENERAL OFFICES, SWIFT & CO. BUILDING.

In general, the inlets and outlets are in the faces of the piers shown at the right. A large diffuser, however, may be seen at the upper left corner.

REASONS FOR NOT RECIRCULATING THE AIR.

There was no provision made for recirculating any of the air, even when cooling, for the following reasons:

It has by no means been demonstrated that any air washer will remove the objectionable conditions from air which has been breathed, or that an air washer will restore the desirable vitality to the air.

In this plant the mental activity and physical welfare of the occupants are of first importance, and operating costs are of little relative importance.

The value of floor space and sunshine are so high that the flues necessary for recirculation would be inordinately expensive.

We have the stockyards odors, of rendering, fertilizer works, etc., to contend with, and their amelioration is considered a sufficient burden without adding any human element.

The owner knows that it is the best of investments for him to promote the most healthful and comfortable working conditions in this building. The occupants and even casual visitors have very little realization of the extent of the physical equipment involved in such promotion. Therefore, we arranged for especially easy access to this plant, with plenty of light, white enameled walls, a special observation room with windows for the air washer, etc.

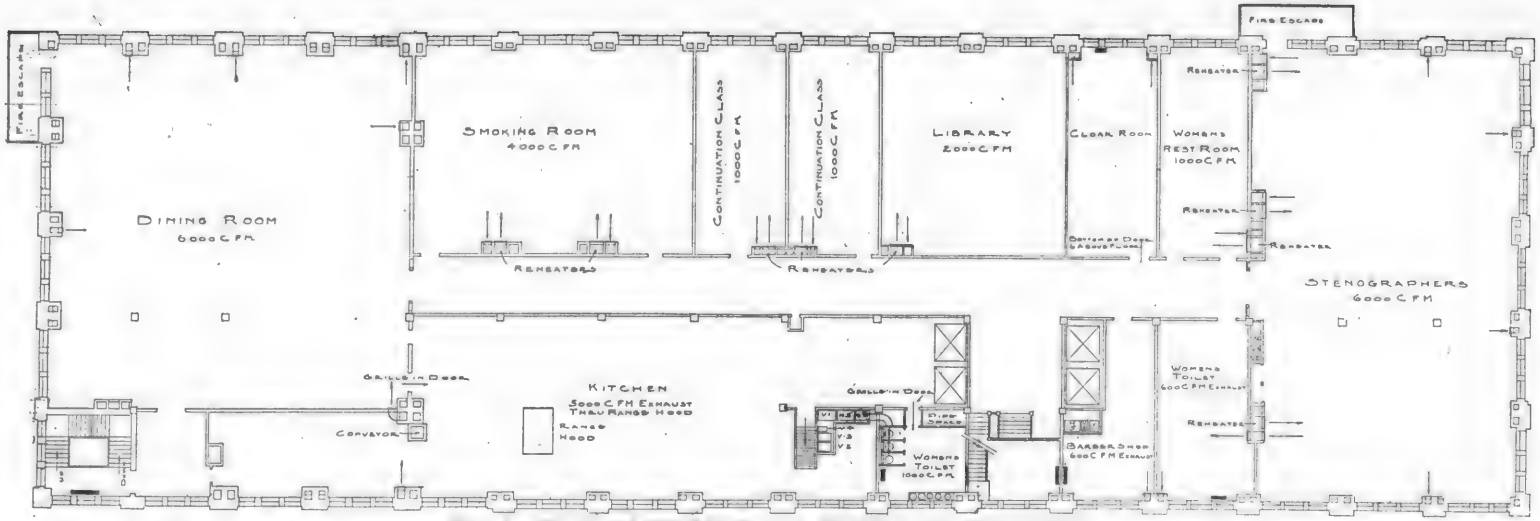


FIG. 8.—PLAN OF THIRD FLOOR, SWIFT & CO. BUILDING.

The toilet and coat rooms have mechanical exhaust, the considerable volume of air removed from them being drawn from the general offices. At the right will be seen the bridge leading to the elevated station.

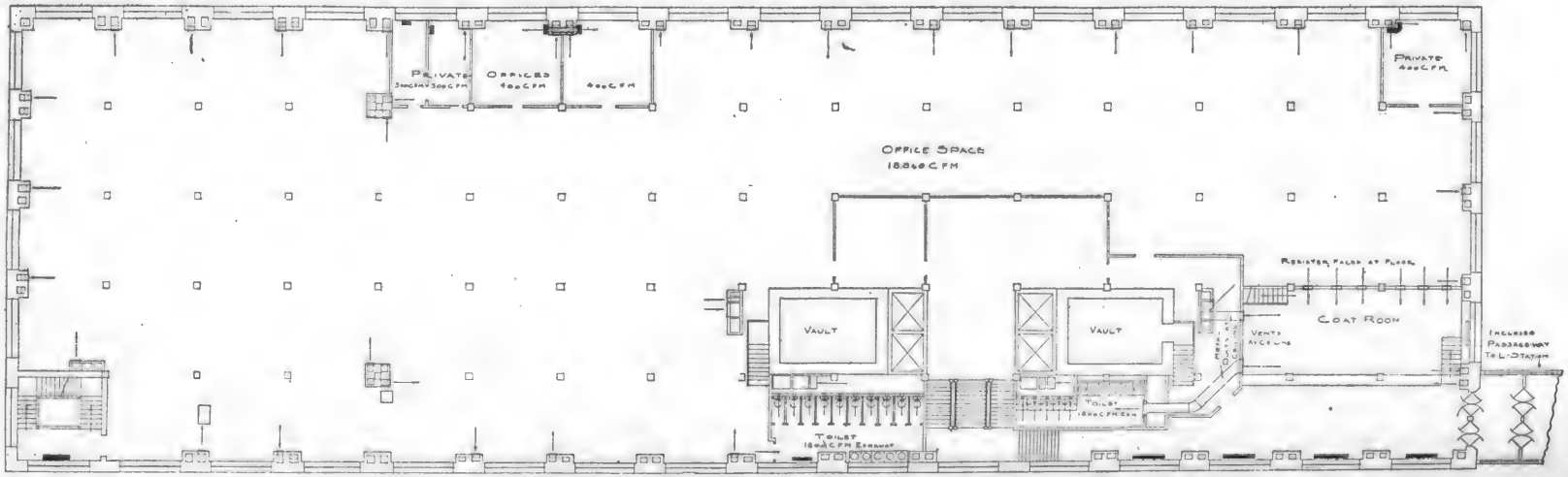


FIG. 9—PLAN OF FIFTH FLOOR, SWIFT & CO. BUILDING.

All air supply to the old part of this floor on account of exigencies of construction, passes across the attic to the various flue locations, then down to the floor and up through the individual reheaters, forming an air lock, so that the reheaters will supply the rooms naturally. The dining room and smoking room are provided with exhaust fan connections while a still greater suction is maintained by the separate kitchen exhaust fan, so that by no chance can odors of food enter the general building.

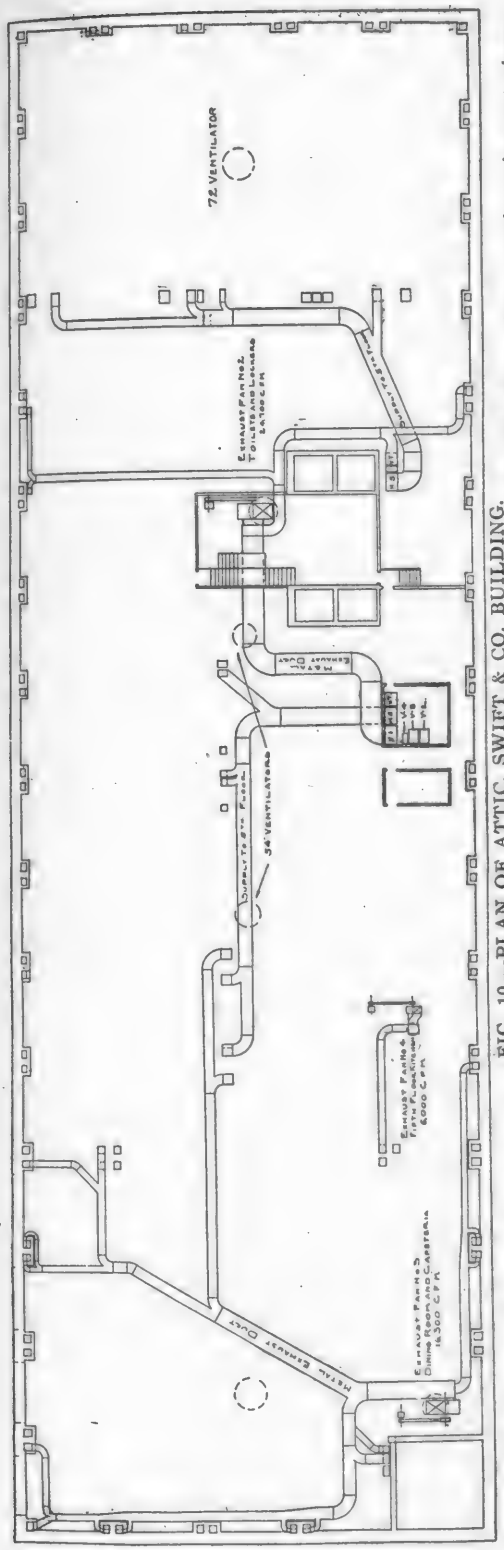


FIG. 10.—PLAN OF ATTIC, SWIFT & CO. BUILDING.
Here are shown the various exhaust fans and ducts, also the ducts which supply air to the offices on the fifth floor. Steam supply mains, not shown on this plan, reach all of the down-feed risers.

DETAILS OF EQUIPMENT.

The air supply comes from the north from a hooded inlet a few feet above grade. This is not the most favorable point for clean air in our judgment, and we hope may later be improved. The use of this inlet at present is governed by expediency.

The fresh air passes first two 9-in. layers of cast-iron Vento heater, encased in enameled brick, not sheet steel, and controlled by a thermostat to prevent freezing the washer. Then the washer is passed, with its influence, as may be, for cooling or heating, drying or moistening the air; then an additional Vento heater, called the economizer, warming the air to the required tempered air duct point, using water of condensation discharged by the vacuum pumps. If this coil is insufficient there is an additional steam-supplied heater coil beyond it, which will be in effect if necessary, as demanded by the duct thermostat.

The air washer is called upon merely to remove as much as possible of the dust and soot, to cool the air in summer, using water which has been chilled by refrigeration, and to introduce moisture in the winter, using water which has been warmed by steam injection. The air washer, as well as the other air-handling equipment, was designed particularly to promote durability and ease of cleaning to the fullest possible extent. There is a reinforced concrete washer tank lined with enameled brick. At the tank waterline, at the inlet to the washer, is a galvanized steel header, from which rise the supply pipes carying Braemer Air Conditioning Company's phosphor-bronze spray nozzles. (Fig. 11). The walls and ceiling are impervious to moisture, and a wide passage across the front of the washer gives access to the sprays. The eliminators, also of Braemer make, are set above the tank, on enameled brick piers, and are built in units, any group of which is easily removable. They are accessible for

FIG. 11.—SPRAY CHAMBER OF AIR WASHER.

To the left are the primary tempering heaters, to warm the entering fresh air above freezing. The air passes the nozzles from left to right. The spray chamber is 30 ft. long.

FIG. 12.—ELIMINATORS, DISTRIBUTORS AND BAUDELOT COILS.

The air, having been washed and otherwise conditioned at the spray chamber, passes through the eliminators shown at the left, on its way to the fan. In winter, ordinarily it is unnecessary to cool the spray water, but it is necessary to warm it, and under such conditions no water flows over the four weirs shown here, and the refrigeration is shut off. In summer, however, the water must be chilled, by contact with brine coils. It flows downward in droplets over the cold pipes, from the distributors shown in the center. The covered pipes overhead are the brine mains.

cleaning from both front and back, and instead of being encased in steel, as is usual, are in a masonry enclosure. They have flooding nozzles. The washer tank has a sewer connection for flushing out, an automatic overflow, and a connection to the pump suction.

There is a larger and much deeper tank beyond the regular washer tank (Fig. 12), also lined with enameled brick, and containing 6,000 sq. ft. of surface of 2 in. galvanized-steel brine coils. When the cooling function is in effect the first or regular tank overflows via concrete weirs to standard Baudelot distributors, the comparatively warm water trickling down over the refrigerating coils to a cool pool below, from which a connection is made to the pump suction.

The circulating pumps (Fig. 13) are each 6 in., direct-connected electric centrifugals, in duplicate.

In winter only the regular tank need be used, the cool tank and Baudelot coils being drained. Humidity control is then established by warming the water as needed, by an injector.

In summer the circulating pump draws from the regular tank or from the cool tank as humidity conditions require, suction from either as desired being achieved by diaphragm valves in both connections.

The equipment is arranged to maintain not more than 80° inside with 60% relative humidity when the outside temperature is not higher than 95° and 48% relative humidity; and to maintain at least 70° inside with at least 60% relative humidity with the air entering the washer at 40°.

This equipment conditions the air to the extent used for cooling, somewhere around 60°, and in this condition all horizontal transmission through the airways to the bases of the flues, is effected. At the flue bases are reheaters (Fig. 14), the steam supply to which is controlled by the thermostats in the rooms. If the rooms are too warm, the tempered air is delivered; if they are too cool, steam is admitted to the reheaters as required.

Distilled water is used for drinking purposes, and this water is cooled and circulated continuously by a pair of duplicate centrifugal pumps. A ther-

FIG. 13.—CIRCULATING PUMPS FOR AIR WASHER.

These 6-in. pumps are in duplicate so that one always is in reserve, and are used to force the water through the sprays. As humidity conditions in the building require, the temperature of the spray water is varied automatically, the diaphragm valves which aid this function being shown at the rear. One of the heavily covered tempered air ducts may be seen overhead.

mostat controls two diaphragm valves, arranged so that the mixture of chilled and normal water may be maintained at the most satisfactory point.

The dining-room on the fifth floor and caféteria on the first floor (Fig. 17), while they serve others besides employees of this office, and the bulk of their business here. It is not necessary to ventilate them to full capacity or all of them, as desired, compelling the maximum air movement reasonably to follow the maximum occupancy.

The kitchen has a separate and powerful exhaust through the hoods over the ranges and kettles and this fan is in operation nearly all the time. A strong current of air is thus maintained from the dining-room through the doors, and from the caféteria via

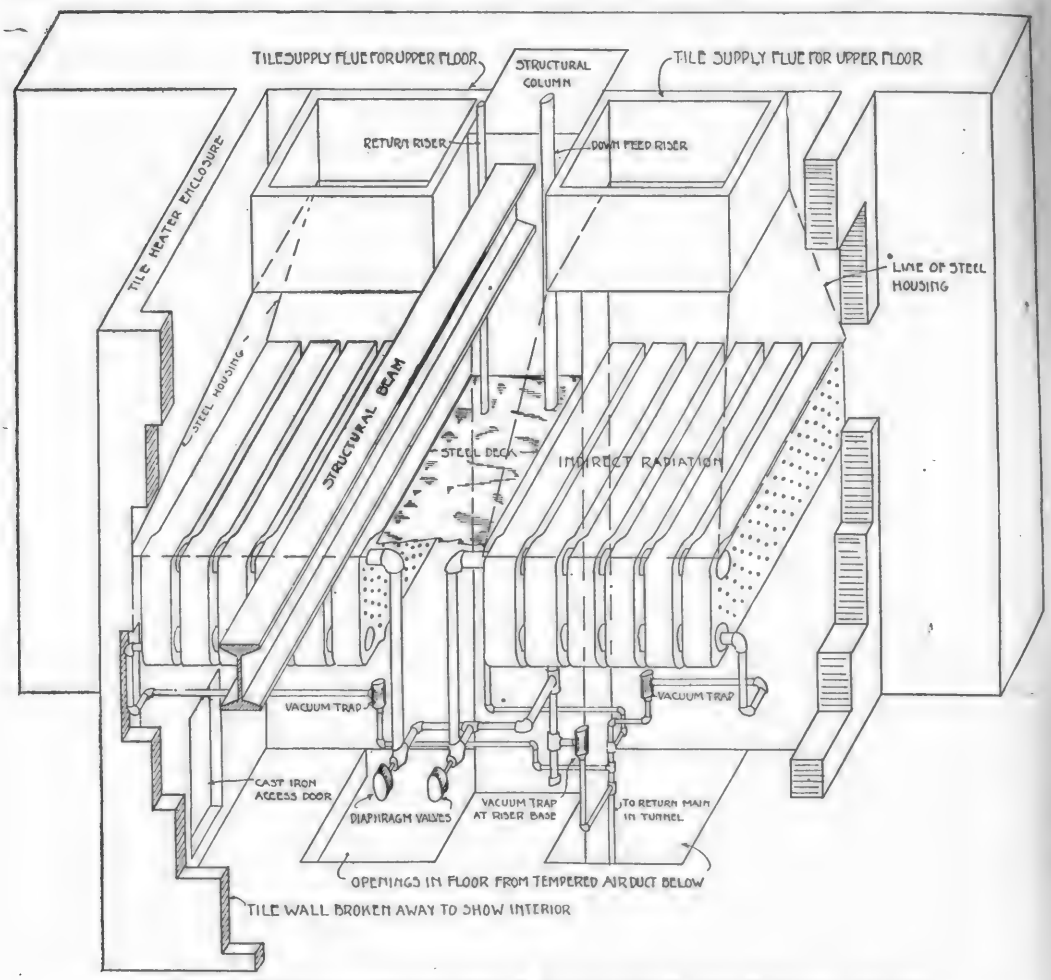


FIG. 14.—TYPICAL ARRANGEMENT OF INDIRECT HEATERS AT FLUES.

Only tempered air is conveyed horizontally, this air being heated further as needed by indirect heaters at the flue bases. These are in the basement in the new part, and in the first floor in the old part. This arrangement permits all diaphragm valves and vacuum traps to be accessible, while entirely concealed. Cast-iron access doors are provided.

except near and during meal times. Therefore, pneumatic switches and dampers are provided which permit the operating engineer to cut off the air to and from either the dining-room, or the caféteria or the smoking room, the conveyor, into the kitchen, tending to cool the latter as well as preventing dissemination of odors.

Similar pneumatic operation is provided for all foul air outlets; and so that when desired for quick heating,

the full force of the tempering heaters may be used, regardless of automatic temperature regulation.

The steam circulation for heating is at atmosphere or lower, using exhaust steam. Each unit of surface has a thermostatic vacuum trap. The vacuum pumps (Fig. 16) are in duplicate, and are electric driven, by silent chains. They run continuously, that is, there is no attempt to control them by stopping and starting mechanism. They discharge the warm water through the first tempering heater on the fan side of the washer, which acts as an economizer, and from this the cooled water passes to the sewer. The economizer is placed here as giving a reasonably low inlet air temperature, and being in no danger of freezing.

FIG. 15.—CAFETERIA, FIRST FLOOR, SWIFT & CO. BUILDING.

Particular attention was paid to the provision that no odors from this room should rise up through the offices above. The measures adopted to prevent this proved successful. About 400 people at one time can be accommodated in this room, and several thousand are fed here every day.

FIG. 16.—VACUUM PUMPS FOR HEATING SYSTEM, SWIFT & CO. BUILDING.

When the heating system is in operation one of these duplicate pumps is always exhausting the condensed water and the air from the radiating surface.

All closet fixtures throughout have register faces behind them, through which strong currents of air pass en route to the exhaust fan, removing odors. In the old installation a very objectionable smell of clothing was noticeable throughout the corridors and lobby. In the new, the check-rooms are kept at less air pressure than the rooms with which they communicate, having exhaust fan connections, so that these odors cannot be observed.

It was impracticable to install duplicate air-handling machinery, due to cost and complication of ducts, and since so little trouble ever originates with fans, there was danger that the idle units would deteriorate from corrosion as soon as the active ones. Therefore, no duplicate fans and motors are provided. However, all motors are belted, so that they could easily be replaced in a few minutes, and duplicate fan bearings are kept in stock. In any event, the shutting-down for a few hours of any exhaust fan would

not be disastrous, and the building is so arranged with its flue base reheaters as to be heated by gravity with the supply fan shut down, when necessary.

In order to neutralize as far as possible the corrosive effect mentioned, the air washer is being operated with caustic soda in the circulating water, at the rate of 1 lb. per 1,000 gal. of water, this being added each time the water is changed. Some further observation and experimentation is indicated in this connection. With an outdoor temperature of 102° the inside temperature was easily maintained at 79° at the warmest place in the building.

NEW HEAT TRANMISSION TABLES

A Remarkable Compilation of Factors as Given by Leading Authorities Covering Latest Types of Construction.

By WILLIAM R. JONES,

Superintendent, Department of Buildings and Grounds, University of Pennsylvania.

III

EXPOSURE CONSTANTS

		[a] Used by U. of Pa.	[b] German Gov. Buff. Forge	[c] Kinealy	[d] Austrian Gov. (Macon)	[i] Thompson	[h] Greene	[f] Hubbard	[z] Allen	[o] Hoffman	[p] Hoffman German Gov.	Recknagle	Reitschel	Klinger	[q] Harding	[r] Amer. Rad. Co.	[x] Donnelly	[y] Hauss	
1	North	.40	.10		.20	.25	.15	.32	.10	10-20	15-25	.25	.10		.15/.30	.10	.10	.10	
2	East	10-20			.15	.10	.10	.12		.05-10	10-15		.10		.10/.20			.10	
3	South	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4	West	20-30			.15	.15	.10	.20		.05-10	10-15				.10/.20			.10	
5	Northeast	20-30						.22		10-20	15-25	.25	.10		.15/.30			.10	
6	Northwest	.40						.26		10-20	15-25	.25	.10		.15/.30			.10	
7	Southeast	—						.06											
8	Southwest	—						.10											
9	North, East, South & West	—						.16											
10	Heated Intermittently	.50	.30				.50		40-50	20-40	.50					.30			
11	Daytime only. Unexposed	.10	.10	.10			.10		.10		.10					.10			
12	Daytime Only Exposed	.30	.30	.30			.30				.30	.20				.20			
13	Exposed to Heavy Winds	—*					.15		.30		10-20	.20/.30	.10			.10		.05	
14	12' to 14½' High	See Formula		.03							.03								
15	Above 13' High											.10						.033	
16	14½' to 18' High			.065							.06							.066	
17	Above 18' High			.10							.10							.10	
18	Corner Walls	—		.05			.10							.20					
19	Air Leakage	—			.10														

*Covered in selecting other exposure constants

14-D——13 to 14½' high.
10-I——At long intervals.
11-I & 11-Ob—Daytime only—closed at night.
12-I & 12-Ob—Daytime only—open at night.
11-N——Daytime only—allowed to cool at night.
13-N——Northern exposure.
1-5-6-Ob—Rooms heavily exposed.
16Y——Above 15' high.

Amounts tabulated above are percentages to be added to heat loss for normal Southern exposure. Higher and lower figures for maximum & minimum exposures.

$t' = t + 0.03\,(h-10)\,t$

$t_1 = \frac{t'+t}{2} = t + 0.015(h-10)t$

t' is temperature of air at ceiling.
t_1 is mean temperature.
t is temperature at floor
h is ceiling height
t should not be greater than 115°.

DOORS

THICKNESS	A U.S. Used at U. of Pa.	B German Gov. (Wolff)	C Rectangle & Reitschel Pine Inner	C Rectangle & Reitschel Pine Outer	C Rectangle & Reitschel Oak Inner	C Rectangle & Reitschel Oak Outer	E De Stuerteyant Cats. 84 & 213 (A. R. Wolff)	F Buffalo Forge Co. Austrian Gov. (Macon) Soft Wood Inner	F Buffalo Forge Co. Austrian Gov. (Macon) Soft Wood Outer	F Buffalo Forge Co. Austrian Gov. (Macon) Hard Wood Inner	F Buffalo Forge Co. Austrian Gov. (Macon) Hard Wood Outer	— Greene 1913	F Buffalo Forge Co.	M Harrison	N Allen	O Tweed	R Nat. Dist Heat. Assn.	S Practical Eng.	T American Rad. Co.	V A.S.H.V. Gen. Practice	M H. & V. Magazine	O Hoffman	P Hubbard	Y Prussian Gov. (Reichnagel)	N Irwin		
½"			.52	.56	.64	.70																					
¾"			.44	.47	.59	.63		.46	.49	.60	.69	.55	.41			.48							.40				
1"			.39	.41	.54	.58		.39	.42	.54	.63	.48															
1¼"			.34	.36	.50	.54		.31	.33	.47	.53	.40	.32			.45							.36	.30			
1½"			.31	.32	.47	.50		.26	.28	.42	.46	.34	.27			.31											
2"			.26	.27	.41	.43		.21	.23	.37	.41																
2¼"			.22	.23	.37	.39																					
3"			.19	.20	.33	.35																					
STANDARD THICKNESS		.414																									
TYPE																											
OUTSIDE DOORS	.56											.55			.42	.48											
INSIDE DOORS (STANDARD)	.40											.34				.31											
DOUBLE DOORS	.57						.572											.27									
DOUBLE DOORS (1¾")	.27																	.44									
DOUBLE DOORS (1¾")	.44																	.34									
VESTIBULE DOOR	.34																										
PLAIN DOOR	.42						.414								.41												

⊙ — FOR OUTSIDE DOORS.
⊗ — FOR INSIDE DOORS.

WOOD

STANDARD THICKNESS

GIVEN AS PINE DOOR

GIVEN AS PINE DOOR

GIVEN AS WOOD AND GLASS DOOR

GIVEN AS WOOD AND GLASS DOOR

GIVEN AS DOUBLE GLASS DOOR

GIVEN AS PINE DOOR

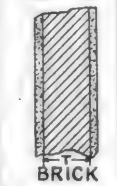
GIVEN AS PINE DOOR

THICKNESS NOT GIVEN

STORM

.572

WALLS



BRICK PLASTERED BOTH SIDES

Thickness T	Used by U of P A	German Gov. (Wolff) B	Recknagel Reitschel C	Kineally D	Hubbard F	Austrian Gov (Macon) G	Greene (1913) I	Buffalo Forge Co. J	Hoffman Q	Harding P	Tweed Q	Nat. Dist. Heat Asso. R	Thompson One Wall Exp. Ha	Thompson Two Walls Exp. Ha	H & V Magazine 1917 K	Donnelly X	Busey U
4"	.43		.43												43		
8"	35		.33			.40									.33		
12"	.28		26			.31									.26		
16"	.24					26											
20"	.21					22											
24"	.18					.19											
28"	.17					17											
32"	.15					.15											
36"	13					.14											
40"	.13					.13											

BRICK FURRING, LATH AND PLASTER ONE SIDE

	AA	BB	CC	DD	LL	GG	II	JJ	QQ	PP	QQ	RR	HH	HH	WW	XX	UU
4"	.33		.29	.28			.28	[4].28			.28	.29			.56		
8"	.27		.24	.23	.32		.24	[8].23	.280	[9].217	.24	.27			.30	[6].414	[8].23
12"	23		.21	20	.26		.20	[12].20	.217	[13].185	.20	.24	.265	.232	.23	[12].300	[12].20
16"	.21		.20	18	.21		.18	[16].18	182	[17].156	18	.21			.20		[16].18
18"	.20												.210	.205		[18].228	
20"	.19			.16	.18		.16	[20].16	.161		16	18			.18		
21"	.18												.187	.185		[21].200	[21].16
24"	.16				.16		.14		.147	[24].132	.14		.167	.150	.16		
27"	.15												.152	.140		[27].157	
28"	.15				.14		.13		.133		.13				.14		
30"	.14												.140	.130			
32"	.13						.12		.119		.12				.12		
33"	.13												.130	.120			
36"	.12												.120	.113			
40"	.11												.112	103			

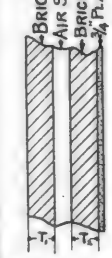
CC: In place of furring German practice uses 1.5" thick with air space and 1:3 made of mortar and plaster of Paris

LL: Given as 80% of plain brick

QQ: .7 of non-furred wall

XX: Based on tests by Harding

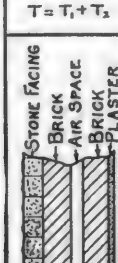
WALLS



BRICK WITH AIR SPACE ¾" PLASTER

$T = T_1 + T_2$

Thickness $T = T_1 + T_2$	Used by U of PA. A	Recknagel Reitschel C	Peclet (Carpenter) E	Austrian Government (Macon) G		Greene 1913 I	Buffalo Forge Co. J	Hubbard F	Thompson: 1 Wall Exposed, Furred and Plastered Ha	Thompson: 2 Walls Exposed, Furred and Plastered Ha	Thompson: 1 Wall Exposed 15% Added, Plastered on Ow Ha	Thompson: 2 Walls Exposed 15% Added, Plastered on Ow Ha	Thompson: 1 Wall Exposed 20% Added, Without Furring or Plaster Ha	Thompson: 2 Walls Exposed 20% Added, Without Furring or Plaster Ha	Nat. Dist Heat Assn R	Busey U
4"	.36		.36													
8"	.27	.25	.30	.23		.27	[8].25	.340							.25	[8].25
12"	.22	21	.25	.19	.27	.22	[12].21	.272	[12].220	[12].170	[12].253	[12].196	[12].264	[12].204	22	[12].21
16"	.19	.19	.21	.17	.22	.19	[16].19	.221							.19	[16].19
18"	.17		.19						[18].175	[18].137	[18].201	[18].158	[18].201	[18].164		
20"	.16	.16	.18		.19	.17	[20].16	.187	[20].160	[20].125	[20].184	[20].144	[20].192	[20].150	.16	[20].16
24"	.15	.14	.17		.17	.15	[24].14	.170	[24].147	[24].115	[24].169	[24].132	[24].176	[24].138		
28"	.13	.13	.15		.15	.13		.153	[28].135	[28].105	[28].155	[28].121	[28].162	[28].126		
32"	.12	.12	.13		.13	.12			[32].117	[32].090	[32].135	[32].104	[32].140	[32].108		
36"	.12	Air Space 2.4"	12	Air Space 1"	.12			No Plaster 85% of Plain Brick	[36].110	[36].084	[36].127	[36].097	[36].132	[36].101		
40"	.11		.10		.11				[40].100	[40].077	[40].115	[40].089	[40].120	[40].092		
30"	.13		↓		Air Space 2"				[30].125	[30].097	[30].144	[30].112	[30].150	[30].116		



$T = T_1 + T_2$

	A															
8"	.25						.32									
12"	.20						.20									
16"	.17						.17									
20"	.15						.15									
24"	.14						.14									
28"	.12						.12									
32"	.12						.12									

Given for brick or stone with air space. Does not state whether plastered or not

Does not state whether plastered or probably plastered

Given for brick hollow and plastered

FLOORS	THICKNESS	USED AT U. OF PA A	THOMPSON Hoff	GREENE 1913 I	BUFFALO FORGE Co. J	HARDING P	HAUSS GER. PRACTICE Y	TWEED Q	NAT. DIST. HEAT ASSO. R	AMERICAN RADIATOR Co. T	H&V MAGAZINE 1917 —	IRWIN N						
DIRT FLOOR SURFACE		.20	.23		.20			.20	.13	.23	.23							
			GROUND TEMPERATURE ASSUMED TO BE 50°F.															
CEMENT OR CONCRETE. EARTH		AA	HHa		JJ	PP	YY	QQ	RR	TT		ZZ						
		.31	.31		.31	1st .784	.08	.30	.29	.31		.29						
			HHb			3rd .714												
			.30			4th .655	STONES LAID ON EARTH					STONES LAID ON EARTH						
						5th .563												
WOOD FLOORING CEMENT OR CONCRETE		AAA	HHHa		JJJ			QQQ	RRR		WWW							
		.12	.08		.10			.10	.14		.10							
PLANK ASPHALT		AAAA				NNNN	YYYY		RRRR			ZZZZ						
		.20					.20		.20			.20						
TILE		AAAAA	HHHHH	IIIII	JJJJJ			QQQQQ	RRRRR									
		.31	.31		.31			.30	.29									
			GROUND TEMPERATURE ASSUMED TO BE 50°F.															
TILE ON GROUND NO WOOD FLOOR ABOVE	PP— 1" FINISH ON TOP NOT SPECIFIED WHETHER FLOOR OR CEILING. EARTH UNDER CONCRETE NOT SHOWN.																	

FLOORS	THICKNESS	USED BY U. OF PA. A	GERMAN GOV. (WOLFF) P	RECKNAGEL & REITSCHEL C	B.F. STURTEVANT CATS. 84 & 215 (A.R. WOLFF) R	THOMPSON Ho	GREENE 1913 I	BUFFALO FORGE Co. J	ALLEN N	HOFFMAN O	TWEED Q	NAT. DIST. HEAT ASSO. R	H.&V. MAGAZINE K	DONNELLY X	HAUSS GER. PRACTICE Y	IRWIN N			
WOOD FLOORING TILE ON GROUND		.11				.08		.10			.10	.14							
								TEMPERATURE OF EARTH GIVEN AS 50-52° F											
CEMENT TILE ON GROUND		AA											WW						
		.30											.30						
SINGLE FLOOR WITH SLEEPER ON EARTH		AAA				HHHa		JJJ				RRR	WWW		YYY	ZZZ			
		.13				.10		.10				.13	.10		.16	.16			
						HHHb						PLANKS LAID DIRECTLY ON SLEEPERS			PLANKS LAID ON EARTH	PLANKS LAID ON EARTH NO SLEEPERS			
						.10													
WOODEN BEAMS PLANKED OVER AS FLOORING		AAAA	BBBB		FFFF				NNNN	OOOO		RRRR		XXXX					
		.13	.083		.083				.083	.17		.13		.214					
			CUTS AT WOODEN BEAM CENTRES THEN PLANKED OVER AS FLOORING SEE FOLLOWING SHEET P 32		PROBABLY MEANT FOR USUAL FLOOR OF JOISTS & BOARDS				SEE SHEET NO. 32	DIMENSIONS NOT GIVEN STANDARD 3"x12" BEAM AND 3" PLANK ASSUMED		MILL CONSTRUCTION		MILL CONSTRUCTION		PLANKS LAID ON EARTH PROBABLY NO SLEEPERS			
STANDARD WOOD FLOORING ON 3" PLANK 12"x12" WOOD GIRDERS		AAAA					IIIII												
		.16					.16												

FLOORS

	Thickness	Used at U. of Pa. A	German Gov. (Wolff) B	Kineally D	B.F. Sturtevant T	Irwin N	Austrian Gov. (Macon) Q	Thompson Hg	Greene 1913 I	Buffalo Forge Co. J	Snow K	Hubbard L	Harding U	Hoffman O	Tweed Q	Nat. Dist. Heat. Assn. R	Practical Eng. S	Amer. Rad. Co. J	Donnelly X	Hauss Y	H. & V. Magazine W
Single Floor. No Plaster Beneath Floor		.29	.083	.45	.083		.33	.10	.33	.45	.186			.45	.40	.36		.083	.30		.45
			Given As Wooden Beam Construction Planked Over As Floor Provious Construction Made																		
Double Flooring No Plaster Beneath Joist — Total 1½"		AA		DD		ZZ		HHa	II	JJ	KK				QQ	RR			YY		WW
		.20		.31		.07		.08	.23	.31	.129				.27	.26			.07		.31
Single Lath & Plaster ¾" — Floor Beneath		AAA		DDD				HHHa	III	JJJ	KKK			000	QQQ	RRR			XXX		WWW
		19		.26				.08	.031	.26	.114			.26	.20	.25			.20		.26
Single Flooring — Deaf'd Wood Filling — Air Space — Lath & Plaster		AAAA					QQQQ					Given As Double Wood Floor	Given As Wooden Wall or Floor			RRRR					WWW
		.05					.05									.05					
							Cold Air Under														
Lath & Plaster Std. ¾" Total Thickness — Double Flooring Lath & Plaster Beneath Joist		AAAAA		DDDDD				HHHHH	IIIII	JJJJJ	KKKKK	LLLLL	PPPPP	00000	QQQQQ	RRRRR	SSSSS				WWWWW
		.13		.18				.06	.030	.18	.071	.10	.20	.10	.10	.21	.10				.18

FLOORS

	Thickness	Used at U of Pa. A	Rechnagel & Reitschell C	Austrian Gov. (Macon) Q	Buffalo Forge Co. J	Hubbard L	Hoffman O	Tweed Q	Nat. Dist. Heat. Assn. R	H. & V. Magazine W	Hauss Ger. Practice Y
Double Flooring — Filling — Air Space — Lath & Plaster		.05		.075 Cold Air Under					.05		
Single Flooring — Probably Lath & Plaster		AA	CC	With Cold Air Under	JJ						
		.07	.07		.07						
Double Flooring — Probably Lath & Plaster		AAA	CCC	Given As Floor	JJJ						
		.06	.06		.06						
Filling — Double Flooring — Planks — Plaster		AAAA		QQQQ							
		.06		.055							
Concrete Floor on Brick Arch — Concrete — Brick		AAAAA				LLLLL	00000	QQQQQ		WWWW	YYYYY
		.20				.20	.20	.20		.20	.20 Given As Stone Floor on Arches

CHICAGO COMMISSION ON VENTILATION

TEST OF CHICAGO AND COOK COUNTY SCHOOL FOR BOYS

EDITED BY MEYER J. STURM

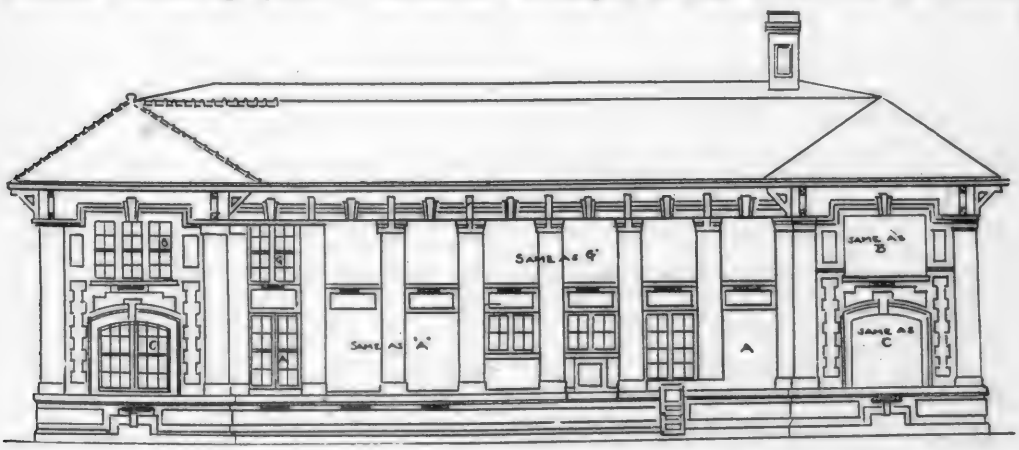
The Chicago and Cook County School for Boys is one of a group recently designed and is comparable in general arrangement to an ordinary elementary school. The entire group of buildings will be supplied with steam from a central boiler plant which is now being built. At present, as described herein, this building has its own temporary plant.

The accompanying plans show the general arrangement of the rooms.

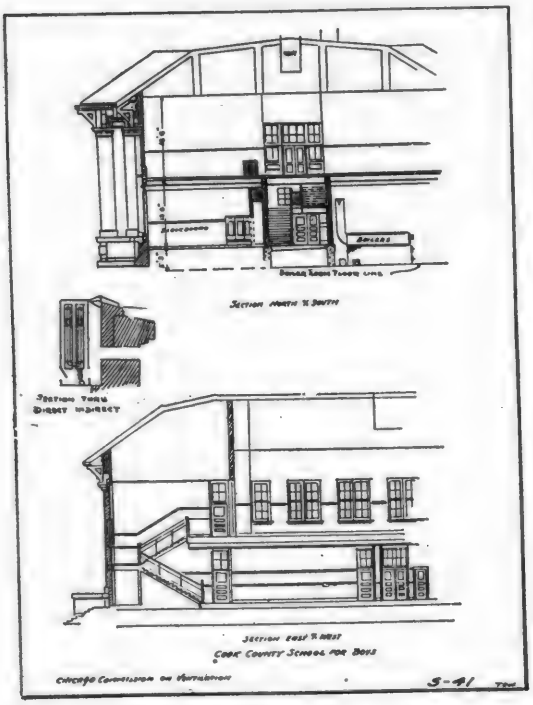
Probably as a measure of economy, no other reason being apparent, a rather unique system of heating and ventilating was installed. The steam circulation is obtained by a double-pipe overhead downfeed system, the returns passing to a receiving tank in the basement and being delivered from the tank to the boiler by an electric pump. There is no direct radiation, independent of the so-called ventilating system. Radiation is of the cast-iron wall type, each radiator being two units wide, encased in sheet steel, and arranged with dampers below and register faces above, so that air may circulate around the radiators. This air is supplied to the radiators as may be desired by damper adjustment, either from out of doors, or from the rooms themselves. In this manner, to some extent, by adjusting the dampers, and by turning off or on the steam in the radiators, temperature regulation is possible. This, however, can only be obtained manually.

The intake openings from outside to the radiator casings, are each 3½-in. wide x 46 in. long, and in each of the standard classrooms there are three such inlets.

The exhaust openings for the first floor are near the ceilings inside the wardrobes, which have slide-up doors arranged so that when they are closed



ELEVATION, CHICAGO AND COOK COUNTY SCHOOL FOR BOYS.

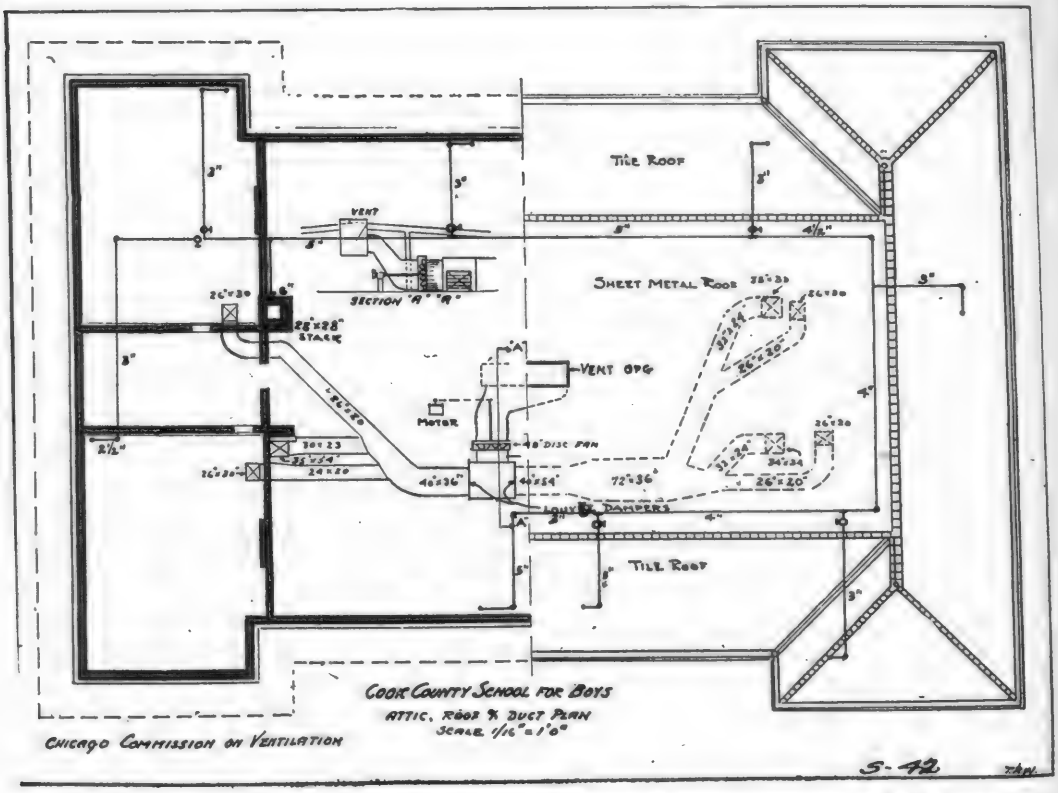


SECTIONAL VIEWS, CHICAGO AND COOK COUNTY SCHOOL FOR BOYS.

there is a space 6-in. from the floor to their lower edge through which air leaves the rooms. The second floor rooms do not have wardrobes, so that the exhaust registers are 8 ft. above the floor connected directly into the flues. The vertical flues, except in the third floor, are so arranged that each flue exhausts from super-imposed rooms on both the first and second floors. The second floor openings into the flues have steel elbows or shields projecting out into the flues behind the registers. All vent flues are connected in the attic, to a gathering chamber.

Where the two main trunk line ducts, one from each half of the building, join the gathering chamber, there are placed balanced louver shutters which open to permit passage of air from the ducts to the chamber and close to prevent any air movement away from the chamber and into the exhaust ducts.

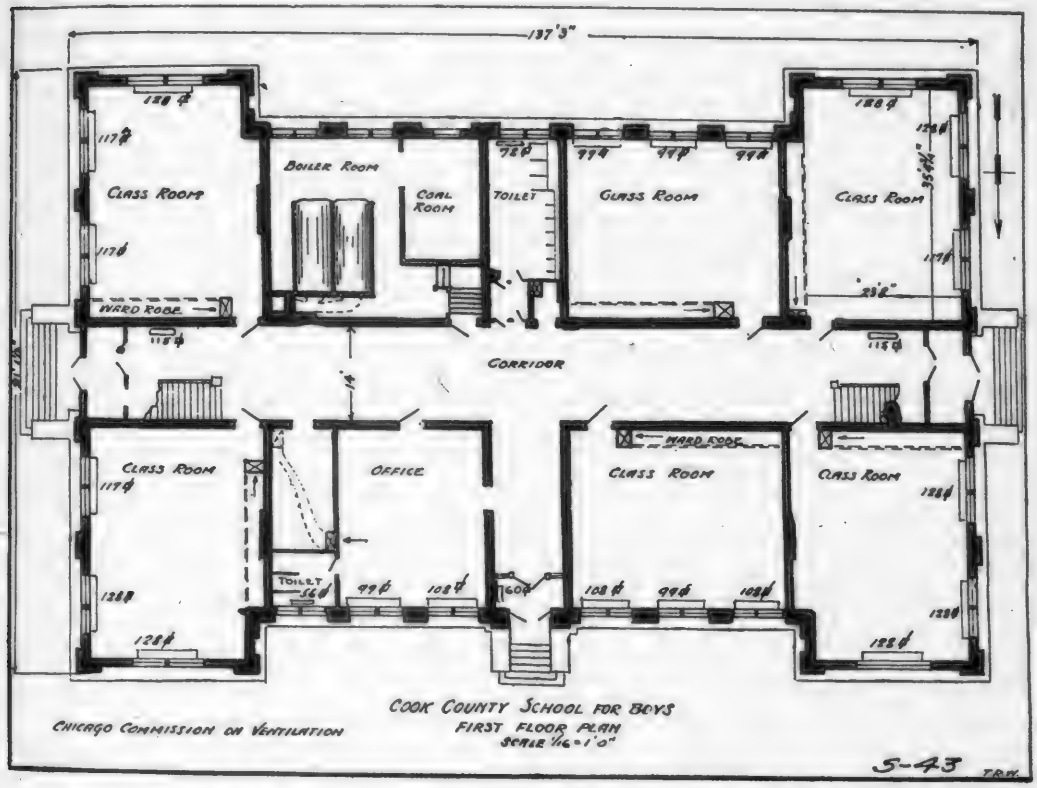
The exhaust fan is a 48-in. disc fan which operates at constant speed and



ATTIC, ROOF AND DUCT PLAN, CHICAGO AND COOK COUNTY SCHOOL FOR BOYS.

no appliances are provided for varying the amount of air handled by this fan. The discharge is through a large opening at about the level of the roof.

The plant comprises an elaboration of the type of ventilation and heating known as direct-indirect and is better than the usual attempts at this because of the comparatively large fresh air intakes, the positive exhaust, and the means provided for varying the air volume and temperature. Compared with the usual installation of direct-indirect heating and ventilation for schools, this plant is very much more liberal as to areas and capacities and is further equipped with a mechanical exhauster.



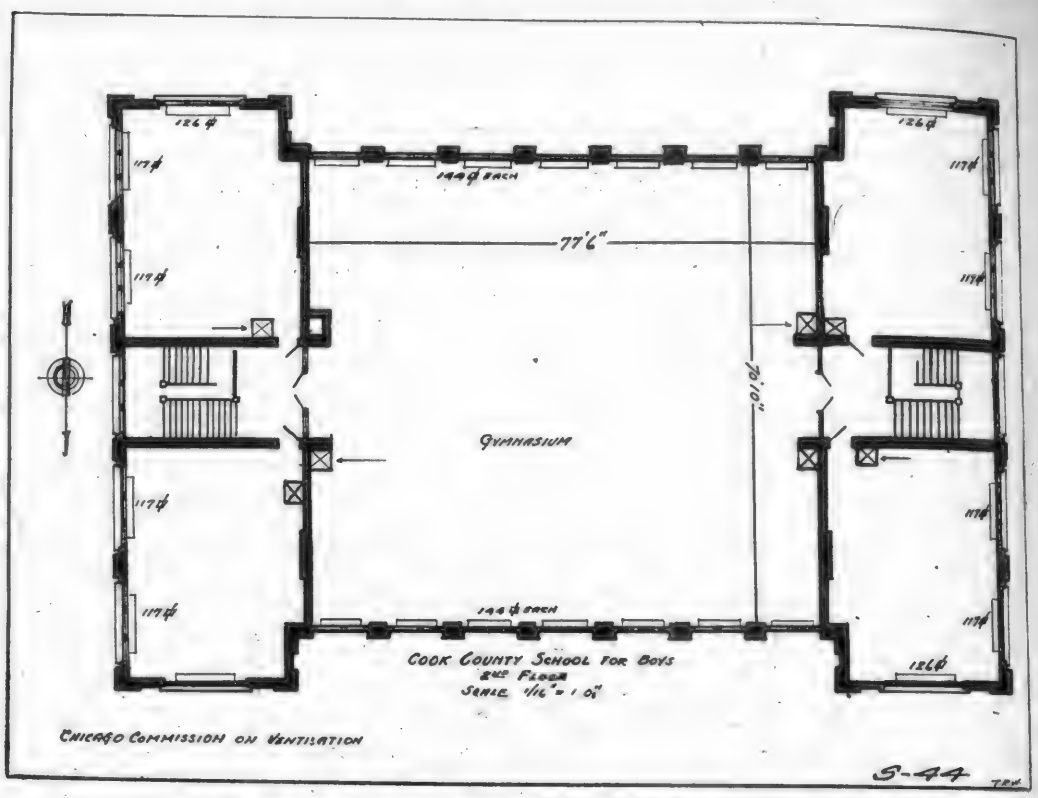
FIRST FLOOR PLAN, CHICAGO AND COOK COUNTY SCHOOL FOR BOYS.

DIRECT-INDIRECT HEATING.

For the purpose of establishing a working definition for the system installed in this school, the following descriptions are given:

Direct heating is the term used when the heating surface, such as steam, water or electric radiators or stoves, is placed in the rooms, recirculating the air in the rooms, no attempt being made to introduce fresh air. Indirect heating is the term used when the heating surface is placed outside the room or in such manner that constant supply of heated air is conveyed into the rooms.

Direct-indirect heating is the term used to describe a system by which direct radiators, or part of them, placed in the room, are partially or wholly encased, and arranged with air supply inlets directly from outside, through the walls, usually under the windows. To introduce any fresh air it is necessary to remove from the room the air which the fresh air is to replace. Ordinarily vent flues are provided, usually with the intention of drawing the air from the floors of the rooms, where it



SECOND FLOOR PLAN, CHICAGO AND COOK COUNTY SCHOOL FOR BOYS.

is presumably coolest. These flues have no efficiency in removing air unless they are warmer than the air outside, and will, unless affected by some local wind condition, have a reverse current whenever they are cooler than the air outside. It is necessary, therefore, in order to secure results with a direct-indirect system of heating and ventilation, to heat the vent flues, or to provide mechanical means to exhaust the air.

Such an attempt at heating and ventilating will not amount to much in the handling of the air, when the fan (if mechanical exhaust is installed) is not in operation, unless the outside temperature is 40° F. or more cooler than the air in the building.

Since the fresh air inlets for this building are in vertical walls, they are necessarily exposed to extreme wind effects and those to windward will deliver excess air, while those to leeward often become outlets, due to the lowered pressure, and to eddy currents.

Since the volume and temperature of the entering air are subject to such great fluctuations, it is evident that the means of regulating the volume and of varying the amount of heating surface with which the air comes in contact should be considerably refined.

With a full knowledge of these conditions, the Chicago and Cook County School for Boys was selected by the Chicago Commission on Ventilation for observation and test, in order that some comparison might be drawn with other school building plants tested or to be tested by the Commission.

Preliminary observations and tests, however, demonstrated at once that owing to conditions of occupancy and because of the profound influence of wind and weather, no particular comparison except as concerned the general system could fairly be drawn.

In the January issue the results will be presented of three ventilation tests in one of the classrooms in this building: with the exhaust fan not running, with the exhaust fan running, and, third, with the fan running and a high wind from the northwest.

UNITED STATES FUEL ADMINISTRATION

Articles appearing in this department are published with the endorsement of the United States Fuel Administration at whose request THE HEATING AND VENTILATING MAGAZINE *is co-operating in a national plan for fuel conservation. It is the fuel administration's desire that we publish in each issue a strong, authoritative article on fuel conservation, regarding the phases of economy which may apply to the heating and ventilating industry. The Fuel Administration is issuing invitations to authors throughout the country to keep editors supplied with desirable conservation articles. Our readers can assist in this work very materially by sending in data and other matter that would be suitable for this department.*

FUEL ECONOMY RESULTS OBTAINED IN HOUSE HEATERS

By A. BEMENT.

One of the reasons why the usual operator of a heating boiler does not readily grasp the essentials of the combustion problem is that he has no visual evidence of the air supply, or, the fact, that while burning one ton of coal, he uses very many tons of air in the process. If this were apparent, air supply would command more attention. The result is that a belief prevails that because a good draft is desirable, it is not possible to have too much of a good thing. This leads to the use of very much more air than necessary, with the result that large quantities of heat are carried to the chimney in this air, which flows through the furnace without assisting in the production of heat or in any way contributing to the combustion process. After long experience I find that in general practice the matter may be reduced to the two simple elements of proper placing of the coal and control of draft.

THE TIME TO FIRE.

The time to fire is when the fuel bed has burned down to such a stage that it requires replenishing to maintain its standard condition, not when steam is low, or when heat is required. The more common practice in heating service is to fire when steam pressure gets low, or heat is desired, and when little heat is needed to run a very thin fire, in some cases the fire door being open, this is wasteful. The time to fire is not when heat is needed, in fact it has nothing to do with the proper firing period. Economy demands that a certain character of fuel bed be maintained all the time, and this implies a good strong fire. It does not follow, however, that this fire need burn rapidly. The rate of steam and heat production should be controlled by the draft; in this way there will always be a good fire ready to respond to any demands made upon it. Thus, it is apparent that the character and thickness of the fuel bed is the feature that produces the economy, and the draft, the one that produces capacity. Two or three cases from actual practice will serve to illustrate these points.

SPRINKLING POCAHONTAS OVER ANTHRACITE.

A residence steam boiler, using anthracite coal, was fired by a janitor. The owner, having absorbed some ideas on better combustion, wanted the janitor to change his method, which the janitor declined to do. The owner then fired the boiler himself for the remainder of the winter. His procedure was as follows:

In the morning, after shaking down the grate, he put about as much coal in the furnace as it would hold, and having a small quantity of fine Pocahontas on hand, he sprinkled some of it over the top of the anthracite as a finishing touch. The result was that the thickness of fuel was sufficient to utilize all of the air which could get through it; this produced a very high efficiency. The steam pressure was constantly at the point at which the regulator was set, and it was carried with a very small damper opening. In the evening the fire, of course, was burned down but still there was a heavy bed which he again renewed the same as he had done in the morning. The result of his improved practice was that coal consumption dropped to one half of what it had been previously and he always had heat.

IMPORTANCE OF FILLING HOLES IN THE FIRE.

In an apartment house where Pocahontas coal was used, the owner complained of the excessive fuel cost. He sought advice and was given a line of instruction which he was told to pass on to the janitor. As this was without successful result, it appeared necessary to give him practical illustration as follows: At nine o'clock in the morning after the janitor had fired the boiler three times, steam pressure was 1½ lbs. with the damper wide open, and the coal was found to be caked together in masses with large openings between and under, through which air flowed to the chimney practically without contributing to the combustion process. The owner took a poker and broke up the fire and leveled it evenly, then added a certain small quantity of coal at thin spots and holes. To do this he used a small shovel belonging to the hot water heater. His attention was called to a hole in the fire which could be plugged with a small lump, then to a vacant place in a corner. When the surface of the fuel bed had been repaired in this manner, which required only a few minutes, about two ordinary shovels of coal had been used in the process. He was then told that when a furnace was coaled, it should be done with about the same care as required in laying a brick pavement. Attention is directed to the fact that in preparing this fire only two shovels of new coal were used. In a few minutes pressure rose to 3 lbs. at which the regulator was set and the furnace went under the control of the damper and remained under its control until 3:00 in the afternoon without any further attention.

WASTE OF COAL DUE TO FORCING BOILER.

In the case of a hot-water heated house, the radiation was not sufficient. The result was that the owner ran the boiler with the damper wide open in an effort to get the house warm which he could not do for the lack of radiating surface. But because the house did not get warm he still kept the strong draft on the boiler. Of course he could have heated the boiler better by using a reasonable amount of draft, but the fact that he could not make the place comfortable led him to believe that a full damper opening would help him out of his troubles. After a while he became disgusted and added a stove as an auxiliary to his heating plant; then his house became warm. It was no longer necessary to expect so much of the boiler, so he cut down the draft with the result that a large saving was made

with the fuel used in the hot-water heater, and the total coal comsumption dropped considerably over what it had been before the stove was installed. The owner was disposed to attribute the improvement to reduced work done by the hot-water heater, when as a matter of fact, it did as much work as before only under very much more economical conditions. The feeling that less work would be expected of the hot-water heater led to cutting down the draft and producing the economic condition, but the economy in fuel was brought about by the draft control, and a comfortable temperature in the house was produced by the auxiliary heating by the stove.

Data Wanted by United States Fuel Administration.

At the request of the United States Fuel Administration, THE HEATING AND VENTILATING MAGAZINE invites its readers to write us concerning the savings that have been made by following he fuel administration's recommendations. Plants which have carefully followed these suggestions should now be able to report interesting facts about what has been accomplished. The replies received will be published in these columns, as far as space conditions will permit.

The data should cover three points:

1. What was done?
2. How was it done?
3. What results were obtained?

The fuel administration believes that in this way many nteresting facts will be brought to light and that those responding will be rendering a valuable service to the fuel conservation programme.

Fuel Saving by Industrial Plants.

Through the co-operation of the industrial power plants, which have thus far put into force the standard recommedations of the United States Fuel Administration to promote efficiency in the use of fuel in power plants, a savng of 7,000,000 tons annually has been effected. That is to say, in the first six months from the announcement of the National program, 3,500,000 tons have been conserved, at the same time maintaining maximum production in the factories.

Some industrial plants which have adopted the standard recommendations and kept systematic records report of a fuel saving as high as 25 per cent, and the average is estimated between 10 per cent and 15 per cent.

A fuel administration campaign comprehends voluntary service by engineer inspectors, lecturers to fuel conservation classes in educational institutions, addresses before public meetings, explanations of the program to power plant owners, and various forms of printed matter and posters.

For the efficient execution of the program of industrial conservation, under the plan developed, the engineers of the country were mobilized through the professional societies and the operating engineers and firemen, and as a result there are today fifteen hundred volunteer engineer specialists and power plant men organized by States, inspecting power plants, classifying them according to their operating efficiency, and aiding the work of rapid development. As a direct result of the operation of this plan, it is estimated that the total annual saving throughout the country will be about 25,000,000 tons of coal without reducing the output of the factories. Special printed material, instructing on the proper use of fuel

Bituminous Storage Limit Off.

All storage restrictions on bituminous coal have been removed by the United States Fuel Administration in conformity to the action of the War Industries Board in cancelling its preferential industries list. Anthracite coal is not affected, however, by the ruling of the fuel administration.

Coal Savings by Zoning System.

Estimates made earlier in the fuel year that approximately 160,000,0000 car miles would be saved in the coal year through the operation of the zone system for the distribution of bituminous coal, are being realized, it is announced by the United States Fuel Administration. This method of distribution was established so that the coal supply of all sections of the country should normally be derived from mines relatively near.

In view of the increased supply of bituminous coal now available, Fuel Administrator H. A. Garfield has issued an order, under date of November 14, modifying the fuel restrictions put upon the manufacture of different clay products and the restrictions on the consumption of fuel in the manufacture of cement. The new order reduces the percentage of curtailment one-half in every case.

THE HEATING AND VENTILATING MAGAZINE

A Monthly Journal of Engineering Progress

Member of the Associated Business Papers Inc.
Member Audit Bureau of Circulations.

Vol. 15 December 1918 No. 12

Published Monthly at Cooperstown, N. Y., by the
Heating and Ventilating Magazine Co.
Executive and Editorial Offices, 1123 Broadway
New York

A. S. ARMAGNAC.....*President*
GUSTAVE PETERSEN....*Secretary and Treasurer*

A. S. ARMAGNAC, Editor
GUSTAVE PETERSEN, Business Manager
HAROLD L. ALT, Contributing Editor

European Representative:
W. G. HOLLINWORTH, 304 High Holborn
London, W. C.

Subscription	$1.00 per year
Canada	1.25 " "
Foreign Countries	1.50 " "
Back numbers	15 cents each
Back Nos. prior to current year	25 cents each

WITH the sudden transition from war to peace conditions the business world finds itself in the condition of a man waking up from a horrible nightmare and rubbing his eyes to make sure he is really awake. The war fever had become so intense that the sheer momentum of our efforts carried us along for a time in spite of the first exuberance of joy over the great victory. When the reaction did come there was an inevitable let-down and a feeling in many minds that war efforts were no longer necessary.

It is true that a vast amount of work and preparation, both in the manufacture of war materials and in the supply of personal comforts for the army, will not now be required, but the danger is that the still pressing needs in the latter direction will be minimized and, possibly, overlooked.

At the urgent request of the American Red Cross we are devoting this space to the Christmas Roll Call of the Red Cross, which is scheduled for the week begining December 16. It is hoped that as a result of "Roll Call Week," national membership in the Red Cross will be limited only by the limits of population; the present membership is 20,000,000 as compared with 300,000 in 1916. Besides the military work of the Red Cross, which is carried on not only for the army of the United States, but for the sick and wounded of the allied armies, a tremendous service has been given, and as much more remains to be given, to the victims of the war in the devastated regions of France, Belgium and other countries.

Between 2,000 and 3,000 workers are now in France where no less than twenty-nine warehouses take care of an average shipment of 15,000 tons per month. It is safe to say that this organization will continue to serve during the coming year in helping to bind the wounds left by a destruction of territory and property which is beyond the mind to grasp.

FROM a commercial point of view interest centers in America's reconstruction programme which is being outlined, as these lines are written, at the great convention of war service committees in Atlantic City. It seems that America is as ill prepared for peace as it was for war and the big job before American business men today is to cut away, as rapidly as safety will permit, the restrictions and curtailments that have transformed industry as we knew it before the war. But in that process the industries are facing the vital question of whether we shall enter upon a competitive era surpassing anything known in the past or whether a larger vision will point the way toward wider co-operation in American business to meet a world-wide competition. May the slogan be, "Onward together!"

OPENING OF THE RECONSTRUCTION ERA

Germany's Collapse Brings the Country's Industries Together to Prepare for Peace Conditions.

The sudden termination of the world war found the industries of America on a vast war basis, the mighty power of which was just beginning to be felt. It is well known that America had not reached the zenith of her strength when Germany sounded her cry for peace, but that, on the contrary, her forces were being rapidly whipped into shape for a stupendous blow in the Spring of 1919.

Such was the situation on November 11 when the word was flashed that the armistice was signed and the war practically won. Even then the completeness of the victory and the dire straits to which Germany has been reduced were not at first realized. But with the publication of the armistice terms and the subsequent events that followed in rapid succession it was apparent to all that the miltary power of Germany had indeed been overcome without hope of resurrection.

With commendable promptness the Chamber of Commerce of the United States immediately set about the task of assembling the business interests of the country to deal with the tremendous problems of reconstruction. Under the chamber's auspices a convention was called at Atlantic City December 3-6, of the 350 war service committees representing all of the industries engaged in war work. This meeting, it was expected, would bring together from 2000 to 3000 industrial leaders. According to the programme the first day was to be given up to separate meetings of these committees for formulating the policies of the various industries represented.

It was then planned to gather the war service committees in 35 related groups. Afterwards these related groups were to assemble as ten major groups representing the ten primary industries within the United States which were defined as food products, textiles; heat, light and power; metals and minerals other than iron and steel; iron and steel; wood and wood products; chemicals; leather; earthern products, and industrial professions.

The speakers included Secretary of Commerce William C. Redfield, A. C. Bedford, James A. Farrell and Paul Warburg.

In the 35 related groups were included coal and coke; public utilities; machinery; tools and power equipment; building materials (except those otherwise specified); engineers, architects and accountants; and trade papers, magazine, newspapers and house organ editors.

A list of 25 questions was sent out by the war service executive committee to the members of all war service committees for use as a basis for the deliberations of the individual war service committees at their first meeting. These questions covered such topics as "What legal methods or means can be introduced in the craft to better stabilize prices during the reconstruction period, affected by inventories on hand, orders placed at war prices but not delivered, labor costs and conditions," etc. Other questions considered the labor situation, financing problems, cancellation of government war orders, the continuation of the War Industries Board, sources of raw materials, uniform methods of cost accounting, methods to simplify production, effect of foreign competition, disposition of the merchant marine, the general question of foreign trade, return of the army to industrial pursuits and, finally, the stimulation of public work and the construction of public buildings. In this connection the groups were invited to consider the building programme in the United States and especially the utilization or destruction of new plants built for war purposes, the location of convalscent and reconstruction hospitals near industrial centers so that the men in such hospitals can be trained in the factories nearest to the hospitals without creating new vocational schools.

The more important actions taken at the convention, as far as they relate to the field represented by THE HEATING AND VENTILATING MAGAZINE, will be presented in the January issue.

The idea that led to the calling of the convention was given by President Harry A. Wheeler, president of the Chamber of Commerce, in a letter to President Wilson, urging the immediate creation of a clearance committee to which all proposals to cancel contracts would be referred by the government departments concerned. The situation, it was set forth, should be controlled by some common authority and the letter pointed out the necessity of harmonizing the policies of the various departments engaged in war work. It was suggesed that a clearance committee, if named, should handle all cancellations, so that raw materials released by the cessation of war production might be allocated to industries able to use them immediately for peace time needs. Another serious situation emphasized by President Wheeler is that involving the protection of

values in stocks of raw materials in hand "which a very large number of manufacturers engaged on government work purchased at the high prices which have prevailed and which they are now carrying. If, through sudden cancellation, these stocks are now freed and no arrangement is made for their utilization in some other direction, there is likely to be a very great decline in prices, temporary at least, until demands in other directions assert themselves."

War Industries Board Announces Relaxation of Regulations.

Immediately upon the signing of the armistice by the Allies and Germany, the War Industries Board began to cancel restrictions upon industry which were imposed for the purpose of compelling conservation. In an announcement dated November 12, it was stated that it will be the policy of the board gradually to lift various restrictions and curtailments, with a view of bringing about as promptly as possible a return to normal conditions.

"In the modification of the curtailments imposed on the manufacture of certain commodities," continues the announcement, "the board has adopted the method of reversing the processes of the Priorities Committee, and there is announced today a list of commodities in respect to which the curtailment is modified.

"Hearty approval has been given by the Council of National Defense to modifications of the regulations governing non-war construction, and the council requested that immediate and widespread publicty be given him so that, to the extent now permitted, building operations might be speedily resumed."

The new order provides that construction projects falling within the following classifications are hereby approved, and no permits or licenses will be required therefor from the non-war construction section:

1. Construction projects approved in writing by the Facilities Division of the War Industries Board.

2. All farm and ranch buildings, structures or improvements.

3. All buildings, structures, roadways, plant facilities or other construction projects of every nature whatsoever, undertaken by the United States Railroad Administration, or by any rail or water transportation company, organization or utility (whether or not under the direction of such administration), or by the American Railway Express Company or by the owner or operator of any telegraph or telephone line.

4. The construction, maintenance, improvement or development by Federal, State or municipal authorities of highways, roads, boulevards, bridges, streets, parks and playgrounds.

5. The construction, extension, improvement, maintenance or repair of any public utility, including water supply systems, sewer systems, light and power facilities and street and interurban railways.

6. The construction, extension or repair of all irrigation and drainage projects.

7. Construction projects connected with the extension, expansion or development of mines of every character whatsoever or connected with the production and refining of mineral oils and of natural gas.

8. The construction, alteration or extension, repairs or additions to plants engaged principally in producing, milling, refining, preserving, refrigerating or storing foods and feeds.

9. The construction of new or the alteration or extension of existing schoolhouses, churches, hospitals, and Federal, State or municipal buildings involving in the aggregate a cost not exceeding $25,000.

10. The construction of new buildings or structures not embraced in any of the foregoing classifications, or the repairs or additions to, or alterations or extensions of, existing buildings or structures, in either case involving in the aggregate a cost not exceeding $10,000.

11. The construction of new buildings or structures not embraced in any of the foregoing classifications, or the repairs or additions to, or alterations or extensions of existing buildings or structures, in either case involving in the aggregate a cost not exceedings $25,000; when approved in writing by the State Council of Defense or its duly authorized representatives.

12. Buildings begun prior to September 3, 1918, where a substantial portion of the building has already been constructed.

Section 2 of the order states that all limitations on the production of building materials are removed, and the material so produced may be sold and delivered for use in connection with any building project for which no permit or license is required.

Section 3 refers to the restrictions upon industries and manufacturers in their production and consumption of certain materials. These restrictions are now modified so that they are 50% less than the former restrictions. The commodities referred to include coal, coke and wood-burning cooking and heating stoves and ranges; gas ranges, water heaters, room heaters; hot plates and appliances; oil and gasoline heating and cooking devices; electrical heating and cooking devices; electric vacuum cleaners; electric

fans (including motors); and builders' hardware.

According to Section 4, dealers (wholesale and retail) in raw materials, semi-finished and finished products are relieved from the obligation to give and require pledges relating to such commodities, except as limited by the other sections of the new order already mentioned. Such dealers, however, are relieved from the provisions in the pledges formerly required which made it necessary for manufacturers to exact pledges from those buying products for re-sale.

Section 5 states that the Priorities Division of the War Industries Board will assist industries in procuring materials, fuel, transportation and labor to enable them to increase their operations to normal limits as rapidly as conditions may warrant.

The Last War Order of the War Industries Board.

As a matter of historical interest we present herewith the revised attitude of the War Industries Board toward non-war construction, with particular reference to granting federal licenses for houses for war workers, promulgated October 28, as representing the policy that would have been in effect if the war had continued.

In a circular on the subject the board called attention to the urgent need for the construction by private capital of houses for war workers and a plan was presented for licensing such projects which differed substantially from the normal procedure applying to non-war construction.

According to this plan, "home building committees" were to be constituted in certain localities. These committees were to gather together individual projects into groups, make application for collective federal building licenses and be responsible for the requisitioning of materials.

Such applications were to be approved by the United States Housing Commission. The "home building committees" were to be established by the State Councils and were to include a local representative of the State Council of Defense, a local representative of the Home Registration Service Bureau of the U. S. Housing Corporation (in communities where same is established), and a builder of broad experience. Provision was made for the addition of other members to this committee.

Federal War Housing Subject of National Conference in Boston.

Government war-housing projects, government housing as a permanent policy and housing in the reconstruction period were subjects of consideration at the Sevnth National Conference on Housing in America, held in Boston, November 25-27. One of the speakers was Thomas Adams, town-planning advisor to the Commission of Conservation of Canada whose subject was "Housing and Reconstruction" with special reference to the reorganization of industry and the redistribution of labor following the demobilization of the army. Other questions on the programme for discussion were whether the government should continue its policy of building model villages and groups of houses in all parts of the country and how the improved housing standards set by these federal housing enterprises can be extended and maintained.

Municipal Reconstruction in America.

For those interested in a reconstruction programme for American cities a valuable bibliography on the subject, including titles of magazine articles, British literature on reconstruction, and French books on reconstruction, has been prepared by the New York Public Library and published in Municipal Reference Library Notes for November 13, 1918. (Room 512 Municipal Building, New York.)

Close of the War Will Not Stop Shipbuilding.

We are only now beginning our progress of ship construction. The removal of the emergency cannot and will not bring an end to the world's need for ship, nor prevent us from carrying out our program to a successful conclusion. We shall continue to use all the facilities of shipbulding that business economy will permit.

I mean by that, that all shipbuilders who live up to the expectations placed in them by the Government will be expected to continue to build ships. They shall be encouraged to do so. There will be plenty of work for every efficient yard.

On the other hand, the Government expects to continue to supply the material and direct the vast energies now devoted to shipbuilding. The end of the war will mean only the removal of the menace which confronted the world's shipping; it will not and cannot mean the immediate elimination of the need for ships.

To take advantage of this established industry and restore to the world its lost tonnage is a natural and business-like procedure. It offers America the chance now

to serve humanity by putting ships on the high seas to carry materials for reconstruction, and to be of service to our own people and our allies.

So, I can say with frankness that our shipyards will be kept going to their capacity, and they must not let up.—EDWARD N. HURLEY, chairman United States Shipping Board in the *Emergency Fleet News,* October 31, 1918.

Hold Your Liberty Bonds.

Some get-rich-quick concerns are endeavoring to persuade patriotic Liberty bond holders, whom they know will not sell outright their Liberty bonds, to turn over the Liberty bonds, to these companies as security for a loan and with the money thus borrowed purchase stock in their companies.

A Liberty loan bond is the safest investment in the world, and a prudent man will very carefully investigate any effort to induce him to exchange it for a less safe investment. This lending one money on Liberty bonds as security to purchase stock in the lender's company is in many cases only a thinly disguised method of exchanging stock of doubtful value for Liberty bonds of unquestioned value.

It is a good business and it is patriotism to hold your Liberty bonds.

War Savings Sales Near Billion Mark.

Including cash received in the Treasury Department on October 21 from the sale of War Savings securities, the total Treasury receipts from this source amounted to $801,453,415.86. This represents the purchase of War Savings stamps to the total maturity value of approximately $950,824,474.10.

The Largest Business Unit in The World.

Judged by almost any standard the Bureau of War Risk Insurance is probably the largest business unit in the world. In the twelve months just ended the bureau has mailed more than 6,500,000 checks in payment of allowances and allotments, representing a total disbursement of almost $200,000,000 for the care and maintenance of the families and dependents of our army and navy. During the same period the bureau has written nearly $35,000,000,000 of this insurance. The army and navy is more than 90 per cent insured and new applications are now being received for more than $1,000,000,000 of this insurance per week. The bureau has made awards and is paying monthly compensation on more the 5,000 death and disability claims and is paying monthly installments of insurance on more than 9,000 insurance death claims..

In the performance of this threefold task the bureau has within the year handled nearly 3,900,000 insurance applications and more than 3,800,000 allotment and allowance forms, and it has been necessary to prepare and mainain under constant control more than 26,000,000 separate individual card records. The bureau has received and answered more than 3,000,000 letters. From a small organization of twenty persons working in the basement of the Treasury Department, the bureau has grown until now is has a working force of 13,000 employees occupying thirteen buildings in Washington.

"America's Answer."

"America's Answer," a film production which is being exhibited through the Committee on Public Information, is described as the greatest war picture ever thrown on the screen. According to Charles S. Hart, director of the Division of Films, "America's Answer" takes one right into the heart of the world conflict shows how the American soldiers helped to wipe out the canker that was eating into the vitals of mankind. The government is taking an active interest in having this war picture shown in every city and town in the United States.

Effect of War on Air Conditioning Work.

A typical instance of the effect of the war restrictions in the air conditioning field is given by the Braemer Air Conditioning Corporation, Philadelphia, Pa., which reports that it was able to carry on its business successfully in spite of obstacles hard to overcome. During 1917, government restrictions regarding materials and labor were not so exacting as during the early part of this year. During the former period certain installations were made in buildings subsequently classified as non-essential.

During the summer of 1918 the company advised its agents and customers of existing conditions in the following notice:

"We are in full accord with the United States Government's restrictions regarding the furnishing of apparatus and materials for essential work only, but there is no way

of our determining whether an inquiry relates to essential or non-essential work.

"Where the Government considers a project as essential, it will issue a priority certificate, and when this is secured by the owners or whoever has charge of the undertaking, and the number of the priority can be furnished us, we will gladly submit prices and assume a contract for apparatus of our manufacture, but not otherwise.

"Any quotations which we may have made or may make hereafter will be subject to these conditions, for the good of the cause, until the War is won."

To show the adaptability of air conditioning apparatus to various types of buildings and industries the company states that since April, 1917, installations have been made for the following industrial processes: Food products, chemical, steel, zinc, hardware, electric lamp, smelting and refining, glue, meat packing, electric light, storage battery, lithographing, hat manufacturing, and in explosive and municipal plants. Many of these installations were for cleansing and cooling the air used for the ventilation of generator coolers.

Well-water and refrigeration types of dehumidifiers entered into the construction of many of the equipments, not only for comfort, but for speeding up production and overcoming the deteriorating effect of bad atmospheric conditions. In some of the problems, dust removal and reclamation of products lost through exhaust pipes and humidification had to be taken care of, the plants being designed for winter use and the conditioned space maintained at the ideal point.

With the close of the war the prediction is made that the public will find that air conditioning is very much of an essential industry and the company looks forward to a busy period, especially in industrial lines, where efficiency, economy, comfort and speeding up of processes is desired.

To Promote Better Relations Between Native and Foreign-Born Workers.

The Bureau of Education, Department of the Interior, is engaged in a movement to promote better relations between native and foreign born workers in industry. Trade publications reaching employers of labor will help in this service by presenting material in such form that employers can pass it on to their workers by means of the bulletin board, pay envelope, house organ or other medium. The plan is to publish brief articles in the trade publications under such a heading as "Put this on Your Bulletin Board" or one of similar meaning.

1919 Series of War-Savings Certificates and Stamps.

The Secretary of the Treasury, it is announced, has determined upon the issuance of a new series of war-savings certificates and stamps to be placed on sale early in 1919 and to be known as the series of 1919. They will have a maturity date of January 1, 1924. The same thrift stamps and thrift cards now in use will be continued in 1919 and will be exchangeable into new series of 1919 war-savings stamps payable January 1, 1924, in the same way as the exchange has been made during this year.

Killed in Action.

Thomas R. Montgomery, of the accounting department of James B. Clow & Sons, Chicago, was killed in action October 1, at Cambrai, France. He was attached to the Canadian cavalry.

Lieutenant Harry A. Gross, Jr., of the Minneapolis branch of the American Radiator Company, was killed in action in France September 8. He was in charge of a machine gun battery when he met his death. He enlisted in May, 1917, with the marines and was one of four men who were known as the "heating squad," the others being Privates Bevington and Porter, American Radiator Co.; Private Olson, Kewanee Boiler Co.; and Private Drury, Mehring & Hanson Company. Lieutenant Gross was later transferred from the U. S. S. Nebraska to the Officers' Training Camp, at Fort Sheridan, Ill., where he obtained his commission.

Results of Daylight Saving Law.

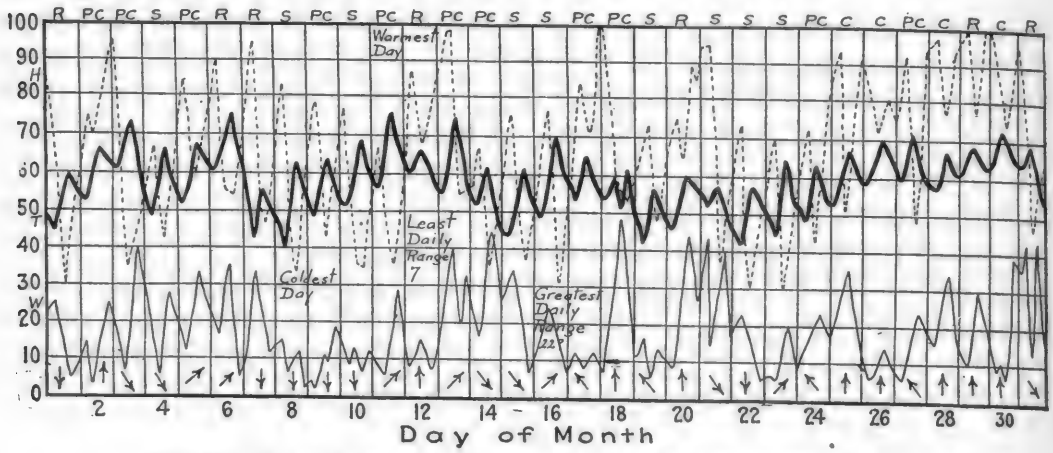
According to the United States Fuel Administration's estimates, 1,125,000 tons of coal were saved by turning the clocks ahead one hour for seven months. Definite reports from St. Louis show a saving of 17.5 tons for each thousand of population on the seven months' basis.

The saving in France for a three months' period was 250,000 tons, which would make a saving of 12.5 tons for each thousand of population for a seven months' period.

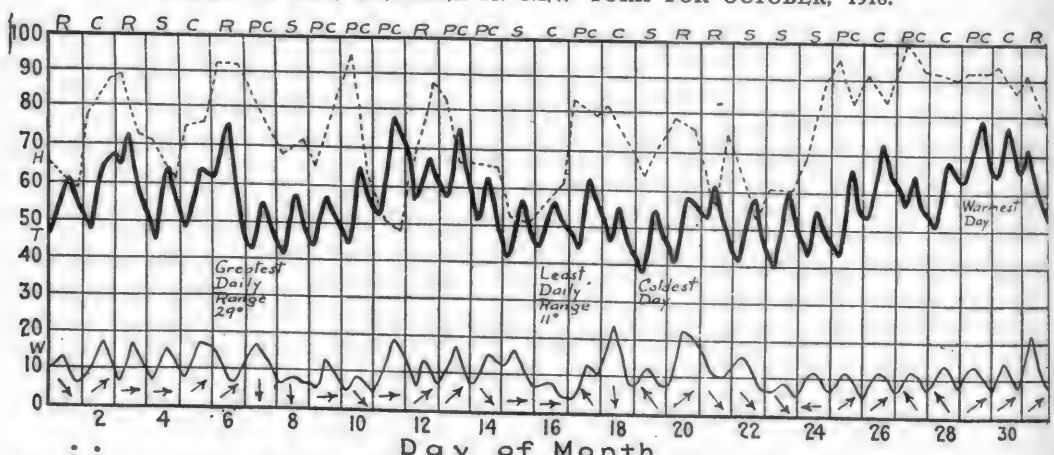
Osborn Monnett, of the smokeless boiler department of the American Radiator Company, is serving as a member of the Illinois Section of the Conservation Division of the United States Fuel Administration.

THE WEATHER FOR OCTOBER, 1918

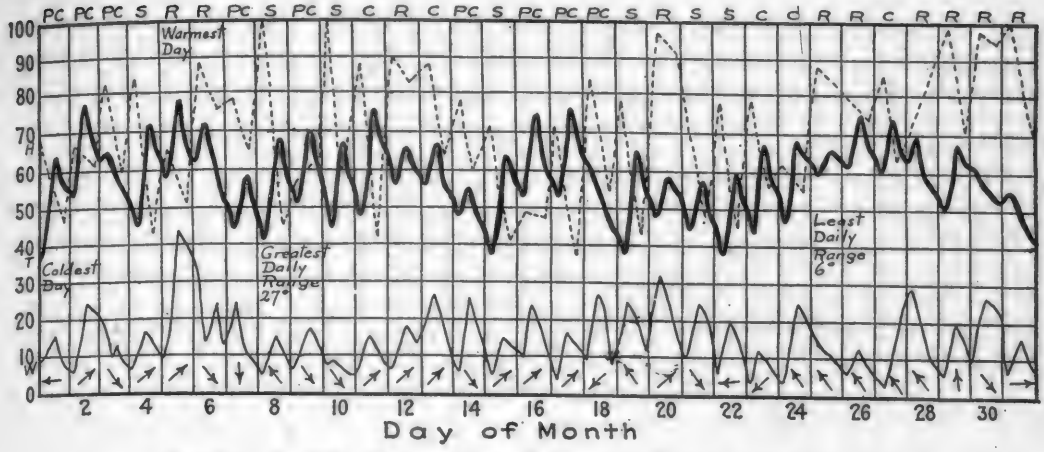
	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, degrees F	75	79	78	80	88
Date of highest temperature	11	29	5	5	5
Lowest temperature, degrees F	40	38	38	37	41
Date of lowest temperature	8	19	1	31	31
Greatest daily range, degrees F	22	29	27	26	25
Date of greatest daily range	16	6	8	15	27
Least daily range, degrees F	7	11	6	3	5
Date of least daily range	12	16	25	23	19
Mean temp. for month, degrees F	58.6	56	58	57.4	62.3
Normal mean temp. for month, degrees F.	55.6	52.3	54.9	53.2	58.4
Total rainfall, inches	0.83	0.99	3.08	2.94	3.63
Total snowfall, inches	None	None	None	Trace	None
Normal precipitation, this month, in.	3.71	3.86	2.36	2.55	2.41
Total wind movement, miles	11444	6610	7370	8936	8766
Average hour wind velocity	15.4	8.9	9.9	12	11.8
Prevailing direction of wind	S.	.W.	S.W.	S.W.	S.
Number of clear days	10	8	7	9	15
Number of partly cloudy days	14	12	19	11	4
Number of cloudy days	7	11	14	11	12
Number of days on which rain fell	8	7	10	12	6
Number off days on which snow fell	---	---	---	1	---
Snow on ground at end of month, in.	---	--	---	---	---



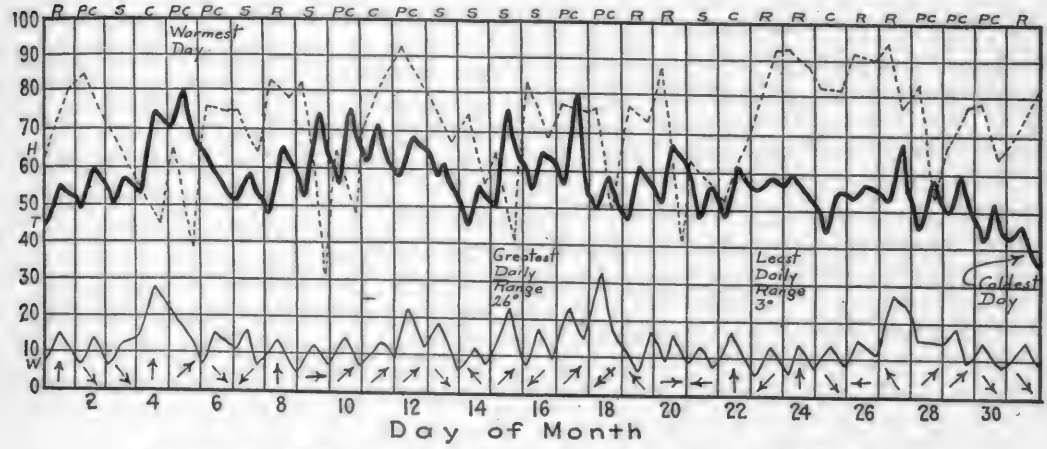
RECORD OF THE WEATHER IN NEW YORK FOR OCTOBER, 1918.



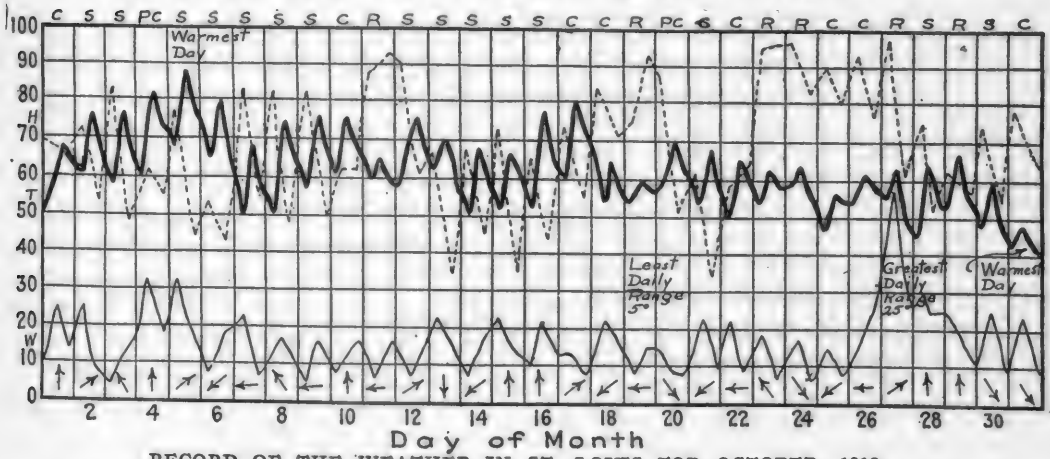
RECORD OF THE WEATHER IN BOSTON FOR OCTOBER, 1918.



RECORD OF THE WEATHER IN PITTSBURGH FOR OCTOBER, 1918.



RECORD OF THE WEATHER IN CHICAGO FOR OCTOBER, 1918.



RECORD OF THE WEATHER IN ST. LOUIS FOR OCTOBER, 1918.

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE, by the United States Weather Bureau.

Heavy lines indicate temperature in degrees F.

Light lines indicate wind in miles per hour.

Broken lines indicate relative humidity in percentage from readings taken at 8 A. M. and 8 P. M.

S—clear, P C—partly cloudy, C—cloudy, R—rain, Sn—snow.

Arrows fly with prevailing direction of wind.

Recent Steam Trap Tests.

An effort to determine the actual capacities of steam traps at different pressures was made during the past year by the meter committee of the National District Heating Association and reported in the Association's Bulletin. The committee points out that the inconsistency of the old method of choosing a trap according to the size of its inlet connection is now generally appreciated and the necessity recognized of selecting it upon the basis of its actual capacity.

Four different types of low-pressure float traps were tested. The method adopted was to run water through the trap under a constant pressure and measure the actual weight of water discharged. The pressure was measured in the trap itself and was maintained at the required point by means of an overflowing standpipe of the proper height.

Special attention is called to the fact that the quantities obtained in this manner represent the maximum capacity of the trap and are taken with the trap flooded, a condition which is seldom desirable during actual operation. The allowable working capacity of the trap is a function of this maximum capacity, however.

No attempt has been made to set forth a different schedule of ratings from those given by the manufacturers, but the published ratings are given with the test results for purposes of comparison.

STEAM TRAPS CONSERVATIVELY RATED BY MANUFACTURERS.

A study of the results as given, states the commitee, leads to the conclusion that all of the traps tested are rated very conservatively by the manufacturers. The desirability of using, for a given service, a size of trap which will work more nearly up to its actual capacity, will depend largely upon local conditions, as, for instance, upon the regularity of flow of the condensation, etc. The data herein given should prove to be of assistance in the selection of the proper size of any of the traps tested.

The tests recorded were made with pressures of 1 lb. and 5 lbs. at the trap, and it was found that the quantity of water discharged varied directly as the square root of the pressure, as would be expected. The capacity of a trap for any pressure can then be obtained by making use of that relation.

Another important fact brought to light

EMPIRE STEAM TRAP.
(American District Steam Co.)

Size No.	Pipe Size of Inlet, Inches	Pipe Size of Outlet, Inches	Diameter of Valve, Inches	Diameter of Stem, Inches	Net Valve Area, Sq. Inches	Manufacturer's Rating, Sq. Ft. of Radiation at 1 Pound Pressure	Maximum Capacity, Pounds Per Hour: 1 Pound Pressure	5 Pounds Pressure
00	¾	¾	.250	.126	.035	500	520	1,152
0	1	¾	.312	.126	.064	600	890	1,800
1	1¼	1	.437	.134	.135	1,700	1,315	2,990
2	1½	1¼	.512	.168	.226	2,800	2,860	6,095
3	2	1½	.687	.168	.349	4,600	4,160	9,150

WRIGHT SPECIAL HEATING TRAP.
(Wright Manufacturing Co.)

0	¾	¾	.437	.187	.123	500	1,125	2,590
1	1	1	.500	.187	.221	1,000	2,020	4,892
2	1¼	1¼	.625	.187	.279	1.650	3,040	7,000
3	1½	1½	.687	.187	.343	3,000	3,700	8,476
4	2	2	1,000	.187	.758	4,000	6,880	15,917
5	2	2	1,125	.187	.966	6,000	9,550	19,770

ANDERSON MODEL D STEAM TRAP.
(V. D. Anderson Co.)

1	½	½	.500	....	.196	1,000	1,128	2,232
2	¾	¾	.750	....	.442	1,600	2,033	3,880
3	1	1	1.000	....	.785	2,600	2,532	4,917
4	1¼	1¼	1.250	....	1.227	4,700	3,327	6,852
5	1½	1½	1.500	....	1.767	7,000	5,096	11,796
6	2	2	2.000	....	3.142	10,000	7,344	16,648
7	2½	2½	2.500	....	4.909	20,000	11,950	26,482

AMERICAN IDEAL STEAM TRAP.*
(American Steam Gauge & Valve Co.)

1	½	½	.500	....	.196	1,160	1,960	4,380
2	¾	¾	.750	....	.442	1,720	2,920	6,640
3	1	1	1.000	....	.785	2,800	4,730	10,530
4	1¼	1¼	1.250	....	1.227	4,310	7,270	16,200
5	1½	1½	1.500	....	1.767	6,100	10,360	23,400

* The capacities given in this table are those published by the manufacturer. They have been verified for the No. 1 size trap by the committee by test.

by the tests is that the capacity of the trap does not depend entirely upon the net valve area, the construction of the valve having an appreciable effect. For example, in traps whose valve stems were equipped with a spider intended to guide the valve, the capacity per unit of net valve area is less than in traps not having this feature, indicating that this obstruction reduces the discharge capacity.

Records Show Value of Intermittent Heating in Steam-Heated Buildings.

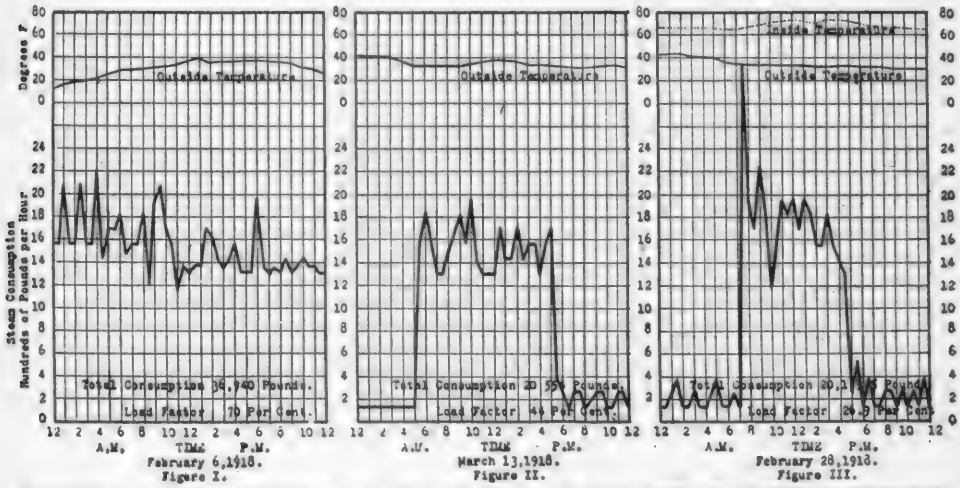
One of the subjects covered in the report of the Public Policy Committee of the National Disrict Heating Association is the question of economies possible in shutting down the steam heating plants in large buildings during the night. In discussing the report in the October issue of the Association's Bulletin, J. H. Walker cites a typical case where a marked reduction in the amount of steam used was obtained by intermittent heating.

"While it is true," he says, "that upon turning on the heat into a cold building steam is condensed at a high rate for a short period, possibly necessitating, in the case of an individual heating plant, the forcing of the boilers to an economical rating, it is doubtful if even this effect is sufficient to offset the saving gained by intermittent operation.

"An example of the effect of shutting off steam at night is shown in the accompanying curves which are actual load curves of a medium-sized office building taken under each method of operation. In Fig. 1 the steam was left on during the night and the amount of steam consumed was 36,940 lbs. In Fig. 2 the heat was shut off at night, except in certain parts of the building which were supplied by a separate main, and the amount of steam used was 20,554 lbs., or 55.5% of the amount used in the former case. The outside temperature on the former day was slower, making the actual net saving somewhat less than this.

In many buildings it is impossible to operate the heating system in this manner, however. Parts of the building may be occupied at night, and the lack of a separate supply main makes it necessary to keep the entire building heated. Also, in modern steel-frame buildings, whose thermal capacity is comparatively low, the excessive cooling of the building during the non-heated period may endanger the plumbing, particularly if it is near the outer walls. These factors should be considered in the design of buildings, for it is no more logical, and far more costly, to heat an unoccupied building than to keep it brilliantly lighted.

In large buildings equipped with a vacuum system and in which it is not feasible to shut off the heat entirely, some economy can be effected by increasing the vacuum and thus reducing the temperature of the radiator surfaces. In one Detroit building in which this scheme is used the rate of steam consumption at night is about 80% of the rate during the day.



RESULTS OF CONTINUOUS AND INTERMITTENT HEATING IN OFFICE BUILDING.

The idea presents itself that a system of thermostatic control could be devised which would automatically reduce the building temperature during the period of non-occupancy. Possibly the present forms of compressed air thermostat could be modified so as to accomplish this.

Another phase of the subject, entirely

apart from the matter of fuel conservation, is the effect of the proposed method of operation upon the load curve of the central (heating) station. The load factor of the curve in Fig. 2 is 44%. In Fig. 3 is shown a load curve for the same building in which the sudden turning on of steam resulted in a divided peak, giving a load factor for that day of only 26.7%. Similar peaks occurred on several other days when load curves for this building were taken. Would the summation of large numbers of similar curves such as this from different buildings results in a disastrous peak, or would there be sufficient natural diversity in them to render the resultant station peak less sharp? It is probable that the latter would be true, for the time of turning on would vary considerably according to the length of time necessary to warm the building. On the very coldest days there would probably be a less noticeable peak because of the fact that many buildings would not be shut off during the night in such weather.

The real result, however, would unquestionably be a decrease in the amount of steam sold and an increase in the plant capacity required per square foot of connected radiation. This would increase the relative value of the so-called "demand" portion of the cost of service and might necessitate a demand charge based upon the actual peak.

That shutting off at night is productive of economy in the use of heat, however, is a fact concerning which there is no room for doubt.

Pipe Bending as a Separate Line in the Heating Industry.

For many years heating contractors have felt very keenly the need of having pipe bending done at home. The inconveniences and loss of time and freight delays have been a handicap.

In Cleveland this situation has been met by the organization of the Ohio Heating and Pipe Bending Company which, for the past two months, has been running night and day and reports work ahead for many weeks to come. This company was organized by Peter J. Schomers as the Schomers Heating & Ventilating Co., with a capital stock of $100,000, specializing in pipe bending and marine equipment and repair. Peter J. Schomers, the head of the concern, was for 18 years with the American Ship Building Co., of Cleveland.

The pipe bending department soon grew to such proportions that the company, on changing its name, was obliged to seek larger quarters at 1061-1063 West 11th Street, comprising 30,000 sq. ft. of floor space. The company is now installing two more large bending tables, 12 x 14 ft., including the furnaces for same. Each member of the organization, it is stated, is a specialist in his own line and the company's equipment places it in a position to render valuable service to the heating trade of Cleveland.

Limitations of Humidifying Devices in Warm-Air Furnaces.

It is common to find in warm-air furnace literature the statement that the water-pan furnished with the heater and usually located in the furnace casing at about the level of the fire-door "will give the necessary amount of moisture to the air." The repetition of this statement in a recently-received circular led to an inquiry as to how much water is actually evaporated with a pan in the location stated. The reply brought out some interesting comments, not only on this point, but also on the use of pans placed above the dome of the furnace.

"The water pans in the present-day warm-air furnace," states this manufacturer, "are of no particular avail regardless of whether they have an automatic float or not. It is not a question of automatic water supply, it is a case of automatic humidification. When a pan is set on the dome of a furnace and an extreme temperature raised, the evaporation frequently is excessive. We found a case last winter where an owner became very enthusiastic regarding humidification and was under the impression that there was no limit. His wife, however, complained very bitterly that the house furnishings were damp and even moist to such an extent, in some cases, that it was unpleasant to place the hands on the arm of a rocker. After many trials he finally concluded that the method we employ (water-pan at level of fire-door) was the most practical.

"Many manufacturers call especial attention to the excessively large water-pan they furnish, which, we think, is an error. The location of our water-pan is such as to afford an opportunity to adjust the pan to obtain a humidity in the house that will work out with the wet bulb.

"We believe you will agree with us that it will require less heat to bring 2 gal. of water to the vapor point than it will to bring 4 or more gallons to the same point. Our water-pan is tapped on two sides for pipe connections and we anticipate placing an automatic float thereon when conditions become normal again We were one of the

first manufacturers to come out with such an arrangement a number of years ago and while we have not employed the float to date, we have been advocating that the installer make a direct water-pipe connection with the vapor pan and place a ⅜-in. Jenkins' disc globe valve on the line. By cracking the valve the water will drip into the pan in such small quantities as not to reduce the vapor stage in the water, whereas the automatic float allows a considerable quantity to be admitted into the water-pan at one time. When low fires are running, it takes considerable time to reach the vapor point again."

The company states that it will conduct a number of tests during the winter with its form of water-pan and hopes to be able to furnish us before long with authentic data regarding the actual evaporating capacity of the pan under varying conditions.

Features of Heating System at Westinghouse Essington Plant.

An idea of how the indirect heat outlets are arranged in the new Essington plant of the Westinghouse Electric & Mfg. Co., which was described in the November issue, is given in the accompanying illustration, Fig. 1. This shows a typical outlet in one of the shop buildings.

FIG. 1—ARRANGEMENT OF INDIRECT HEAT OUTLETS, WESTINGHOUSE ESSINGTON PLANT.

FIG. 2—SECTION OF PIPE TUNNEL, WESTINGHOUSE ESSINGTON PLANT.

Steam for the heating system is supplied through large exhaust mains in tunnels to the different buildings and the water of condensation is drawn through the return mains by vacuum pumps located in the power house. Fig. 2 shows a typical section of one of the tunnels.

New Movement to Standardize Screw Threads.

Many of the old-timers in the trade, who went through the mill when the Briggs standard of screw threads was established, rubbed their eyes recently and read the news again that a new commission had been authorized by Congress and appointed by the Secretary of Commerce under date of September 21, 1918, "for the standardization of screw threads." As stated in the act, the duties of the commission are to ascertain and establish standards for screw threads which shall be submitted to the Secretary of War, the Secretary of the Navy and the Secretary of Commerce for their approval. These standards, when approved, shall be adopted and used in the manufacturing plants under the control of the War and Navy Departments and, so far as practicable, in all specifications for screw thread proposals for manufactured articles, parts or materials to be used under the direction of these departments. It is also intended by the bill that the Secretary of Commerce shall promulgate such stand-

ards for use by the public and publish the same as a public document."

Hearings on the subject were arranged to be held in New York, Dayton, Detroit, Washington and in other places. The first hearing was held at the Engineering Societies, New York, October 7, and was attended by many manufacturers and users of screw thread products. Accompanying the notice of the hearings were topics for discussion, compiled by the National Screw Thread Commission of which S. W. Stratton is chairman. Mr. Stratton is also head of the Bureau of Standards, in Washington.

Topic No. 1 was a query whether there is any objection to the adoption of the American Briggs pipe-thread sizes for both taper and straight pipe threads.

Topic No. 2 referred to the experiments on the form of pipe threads conducted by the Pennsylvania Railroad in connection with the American Society of Testing Materials which "tend to show the desirability of the U. S. Standard form with flat top and bottom one-eight of the pitch" and asked if it was advisable to adopt the U. S. Standard form, instead of the present form which specifies a thread depth of 0.8 in. of the pitch, with a resulting flat at the top and bottom of the thread which is quite small.

Topic No. 3 asked to what extent gauges for checking pipe threads were used in shop practice and what is considered a satisfactory tolerance for ordinary commercial work stated in turns either way from the gauging notch.

The suggested topics also referred to the threading on brass tubing, hose couplings, Acme and other special threads used in machine construction, and instrument threads.

In commenting on the discussion brought out at the hearing a well-known engineer in attendance writes:

"Without exception the opinions were all in favor of maintaining the Briggs standard which has become known as the American Briggs standard (A. S. M. E.) and is now used universally in American and Canadian practice and is known the world over. It would be a calamity to change this standard as the entire manufacturing interests of this country and Canada recognize it and follow it in all their pipes, fittings and valves."

"Practically without exception," continues our correspondent, "every man who gave evidence agreed that the country's standard should not be changed and particularly so at this time and that the War and Navy Departments will be better served by the present popular standards with which all are acquainted than with some new and untried standard. This view applies, to steam, water, air and gas pipes.

"As far as hose couplings are concerned there should be uniformity which does not now exist and the appointment of the commission will be justified if they give us interchangeable hose couplings for fire and water."

As our correspondent points out, a committee of the A. S. M. E., of which he was a member, worked for nine years previous to the beginning of the war in 1914 as a member of the International Commission for an international pipe-thread standard. This international commission would have made its report in October, 1914, had not the European war broken out and its nine pears' labor will be in vain if the American Briggs standard is not adopted as a universal standard throughout the world. The United States committee's efforts were crowned with success to such an extent that the United States, Great Britain, France and nearly all of the other European powers had agreed on a standard so close to the American Briggs that there was no material difference in size, pitch or diameter from the present American and English pipe standards. In his opinion, a universal pipe-thread standard will be set back a generation or more if this country shows that it is not satisfied with its own standard.

Arrangement of Standard Heating and Ventilating Data Sheets.

Numerous requests from our readers that we publish the data sheets that are appearing in THE HEATING AND VENTILATING MAGAZINE each month in consecutive order, rather than apparently at random, prompt us to give herewith the scope covered and to be covered by these sheets. As was stated in a previous issue, some subjects, such as radiators, will occupy no less than 50 or more sheets and it was with a view of avoiding the monotony of a large number of sheets on the same subject that the sequence was varied. Eventually the entire compilation will be published and it will be seen that the sheets have been numbered and arranged in definite order:

Following is the schedule that is being followed:

No. 1. B. T. U. losses.
No. 2. Exposure.
No. 3. Leakage.
No. 4. Temperature range.
No. 5. Computing heat losses.
No. 6. Blank.
No. 7. Ventilation.
No. 8. Air changes.
No. 9. Air.
No. 10. Ducts and flues.
No. 11. Duct and flue details.
No. 12. Symbols.
No. 13. Direct radiation.
Nos. 14-32 (inc.) Direct radiators.
No. 35. Pipe coils.

Nos. 36-37. Indirect radiators.
Nos. 38-42. Cast-iron blast heaters.
Nos. 44-48. Pipe coil blast heaters.
Nos. 50-70. Cast-iron boilers.
No. 71. Steel fire box boilers
No. 82. Horizontal return tubular boilers.
No. 83. Water-tube boilers.
Nos. 90-94. Boiler accessories.
No. 100. Chimneys.
No. 101. Forced draft.
No. 102. Forced draft apparatus.
No. 105. Steel pipe.
No. 107. Standard weight flanged pipe fittings.
No. 108. Extra-heavy flanged pipe fittings.
No. 110. Pipe coverings.
Nos. 111-124. Valves.
No. 128. Flow of steam in pipes.
No. 129. One-pipe steam system.
No. 130. Two-pipe steam system.
No. 131. Vacuum steam systems.
No. 132. Vapor systems.
No. 133. Gravity hot-water heating.
No. 134. Forced hot-water heating.
Nos. 136-150. Fans.
No. 165. Special fans.
No. 168. Belt and chain drives.
No. 169. Exhauster systems.
No. 170. Chemical exhausts.
No. 171. Forge blast and exhaust.
No. 175. Humidity.
No. 176. Air conditioning in industries.
No. 177. Air washers.
No. 190. Temperature control.
No. 200. Boiler-feed pumps.
Nos. 202-207. Feed-water heaters, open.
No. 208. Water weighers.
No. 209. Coal scales.
No. 210. Feed-water heaters, closed.
No. 212. Separators, steam.
No. 214. Separators, oil.
No. 220. Traps.
No. 221. Return trap dimensions and capacities.
No. 245. Hot-water service heaters.
No. 250. Cost data.
Nos. 275-279. Miscellaneous tables.

It will be noticed that blanks are left here and there. This is to provide for the insertion of additional sheets, if necessary. In this connection, readers are invited to send in suggestions for data not covered in the foregoing schedule.

New Sliding Scale Rates for Central Station Heating.

A service has been rendered to the district heating industry by the compilation by Howard E. Long of a revised list of rates for central station heating, based on metered service. The compilation is published in bulletin form (Bulletin No. 148) by the American District Steam Co., North Tonawanda, N. Y. The company states that the bulletin has been in preparation for some time and is accomplished through the courtesy of the various central station heating companies. It is published in loose-leaf form so that new rates or amended rates may be included.

The Cities covered in the bulletin are:

Albia, Ia.; Anderson, Ind.; Atlanta, Ga.; Auburn, N. Y.; Aurora, Neb.; Aurora, Ill.; Baltimore, Md.; (two companies); Beaver Dam, Wis.; Birmingham, Ala.; Bloomington, Ill.; Boston, Mass.; Brandon, Man.; Butte, Mont.; Casper, Wyo.; Canton, Ill.; Canby Minn.; Cedar Rapids, Ia.; Champaign, Ill.; Chadron, Neb.; Cheyenne, Wyo.; Chicago, Ill.; Clarinda, Ia.; Clinton, Ill.; Coatesville, Pa.; Colorado Springs, Colo.; Crawford, Neb.; Danville, Ill.; Davenport, Ia.; Dayton, O.; Dekalb, Ill.; Detroit, Mich.; Decatur, Ill.; Eagle Grove, Ia.; Easton, Pa.; Erie, Pa.; Evansville, Ind.; Eveleth, Min.; Excelsior Springs, Mo.; Galesburg, Ill.; Geneva, Neb.; Geneva, N. Y.; Glenwood, Minn.; Grand Forks, N. D.; Grand Rapids, Mich.; Grinnell, Ia.; Hazelton, P.; Hillsboro, Ill.; Huntington, Ind.; Indianapolis, Ind.; (two companies); Jamestown, N. D.; Johnstown, Pa.; Kansas City, Mo.; Kewanee, Ill.; Kitchener, Ont.; Kokomo, Ind.; Lamar. Colo.; Laramie, Wyo.; Lima, O.; Lincoln, Neb.; Little Rock, Ark.; Lockport, N. Y.; Manchester, Ia.; Marion, Ia.; Maryville, Mo.; Mexico, Mo.; Milwaukee, Wis., (two companies); Mineral Point, Wis.; Minot, N. D.; Missoula, Mont.; Monmouth, Ill.; Morrisonville, Ill.; Nashua, N. H.; Newburg, N. Y.; New York City; Norristown, Pa.; O'Neill, Neb.; Oskaloosa, Ia.; Ottumwa, Ia.; Oxford, Pa.; Paducah, Ky.; Pawtucket, R. I.; Paxton, Ill.; Pekin, Ill.; Penn Yan, N. Y.; Peoria, Ill.; Pittsburgh, Pa.; Pittsfield, Mass.; Portland, Ore.; Port Jefferson, N. Y.; Rochester, N. Y.; Saginaw, Mich.; Salt Lake City, Utah; San Francisco, Cal.; Scottsbluff, Neb.; Seattle, Wash.; Sedalia, Mo.; Shenandoah, Pa.; Shenandoah, Ia.; Sioux City, Ia.; South Bend, Ind.; Spokane, Wash.; Springfield, Mo.; Springfield, O.; St. Paul, Minn.; St. Joseph, Mo.; Streator, Ill.; Sycamore, Ill.; Taylorville, Ill.; Topeka, Kan.; Towanda, Pa.; Washington, Pa.; Waterloo, Wis.; Waukesha, Wis.; Wayne, Pa.; West Bend, Wis.; Wilkes-Barre, Pa.; Worcester, Mass.; Yakima, Wash.; York, Neb.; York, Pa.; and Youngstown, O.

CORRESPONDENCE

Figuring Fume Extraction Problem.

EDITOR HEATING AND VENTILATING MAGAZINE:

In many fume extraction jobs, due to the nature of the fumes, it is essential that they should not pass through the fan. Under these circumstances the ejector chimney is used with a high-pressure fan. For the sake of argument it is assumed that 3000 cu. ft. of fumes (for density, say, air at 70° F.) has to be moved per minute and the frictional resistance up to the base of the chimney is ¾ in. w. g. What quantity of air at what water gauge will be required from the nozzle to ensure this movement? What governs the shape of nozzle and throat of stack? Is this equal to the "equivalent area," as laid down for fan work?

REPLY BY B. S. HARRISON.

As stated the problem is to move 3000 cu. ft. per minute of fumes or gases at 70° F. and of the same density as air at that temperature, through a stack without passing same through a fan, the maintained friction of this system up to the point of entering the stack being 0.75 in. water column, or, say, 0.43 oz. per square inch.

There are three elements of power to be considered:

1. The power to put the air in motion.
2. The power to keep the air in motion.
3. The power to overcome the friction.

As we do not know the height of discharge chimney of stack, we shall assume it to be without friction, the total frictional resistance of the system being assured, or 0.43 oz. per square inch up to the base of the stack.

We will assume that we are to deliver the gases through the stack at a velocity of 1200 ft. per minute, or 20 ft. per second; also that we are going to use 1000 cu. ft. of fresh air per minute through the fan to induce this action.

The stack must then deliver 3000 cu. ft. of gases, plus the 1000 cu. ft. of air, or a total of 4000 cu. ft. of gas and air combined.

The total H. P. of work done will be:

$$\frac{WV + \frac{1}{2}\,MV^2 + \text{frictional loss in pounds} \times \text{area in sq. in.} \times V}{500}$$

W being weight in pounds per second.

V being velocity in feet per second.

$$\therefore WV = 5.12 \text{ lbs.} \times 20 = 102.4$$

$$\frac{1}{2}\,MV^2 = \frac{5.12}{64.4} \times 400 = 32.0$$

$$\frac{0.43}{16} \times 3.3 \times 144 \times 20 = \frac{255.6}{390}$$

$$\frac{390}{550} = 0.7 \text{ H. P.}$$

Now this 0.7 H. P. must be supplied by means of the 1000 cu. ft. of air per minute from the fan:

Assume that a compound nozzle form is used at the base of the stack, of the converging diverging type recognized as most efficient, and that the total efficiency of same is 70%. Then the input, or H. P. applied at the nozzle must be $\frac{0.7}{70\%}$ or 1 H. P.

Therefore the 1000 cu. ft. of air per minute from the fan must deliver 1 H. P. at the nozzle, or 550 ft. lbs, per second.

1000 cu. ft. per minute = 16.2 cu. ft. per second, or 1.28 lbs. per second.

$$550 = 1.28\ V + \frac{1.28}{64.4}\ 3V^2$$

$$550 = 1.28\ V + 0.02\ V^2$$

$$571 = 21 + 1.28\ V + 0.02\ V^2$$

$$32.6 = 4.5 + 0.1415\ V$$

$$28.1 = 0.1415\ V$$

NOTE: These figures are not accurate to decimal places, but are approximately correct.

$\therefore V = 200$ ft. per second, or 12,000 ft. velocity per minute.

Therefore the fan must deliver 1000 cu. ft. of air per minute through the nozzle and while doing so maintain a total pressure of 5.38 oz. per square inch at nozzle. Whether or not the fan is delivering within its "square inches of blast" depends upon its type and capacity and the speed at which it is run.

Measuring Air Delivered Through Mushroom Ventilators.

EDITOR HEATING AND VENTILATING MAGAZINE:

Can you advise me of a satisfactory method of measuring the air delivered through mushroom ventilators by means of anemometer readings in a theatre installation? For the mushrooms on the auditorium floor, it is easy enough to measure the air by using the anemometer in the intake to the mushrooms, as the plenum space under the auditorium is accessible. On the balcony floor, however, the plenum space is not accessible, and hence the reading must be taken at the outlet of the mushrooms.

If one were to set a stove pipe about 8 in. or 10 in. in diameter and, say, 8 in. high, over the mushroom and read the flow at the upper outlet of the pipe, will the results be correct? If not, what percentage of error will result, due to the friction in the pipe? All other mushrooms except the one where readings are being taken are, of course, unencumbered. Your advice upon this matter will be greatly appreciated.

Seattle, Wash. E. L. W.

We would suggest the use of a paper cone, the small end of which is the exact diameter of the anemometer used and the large end of sufficient diameter to be at least 6 in. distant from the mushroom outlet all around the circumference. While this method will not perhaps give results which are absolutely accurate, owing to the fact that there will be leakage around the bottom of the cone and a certain amount of resistance caused by the obstruction of the anemometer over the cone outlet, it is quite likely that the error will be less than that caused by the anemometer itself which, as is well known, is far from being absolutely correct. It is believed that the foregoing method will give satisfactory results for practical purposes. To obtain anything more accurate would require the use of a Pitot tube.

Steam Specialties, described as a book full of ideas and data on steam plant operation, has just been issued by the Wright-Austin Co., Detroit, Mich.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Date Fixed for Annual Meeting.

The dates for the annual meeting of The American Society of Heating and Ventilating Engineers have been fixed for January 28-30, 1919, with headquarters at the Engineering Societies Building, 29 West 39th Street, New York. With the close of the war and the revival of general business activity, an unusually large attendance is looked for that will reflect the importance of the new times and conditions.

New York Chapter Discusses Engineering Economics of Heating.

Under the title of "Engineering Economics of Heating," M. W. Ehrlich addressed the New York Chapter, at its November meeting, November 18, showing a number of charts he had developed on the coal requirements of buildings, either with steam or hot water heating systems, based upon varying outside weather conditions. Mr. Ehrlich's charts were the result of observations of the plants of several hundred buildings, including many of modern type.

He showed that in a climate like that of New York a heating plant designed on a "zero to 70" basis operates at an average of 42% of its capacity so that there is a large reserve capacity that is only needed at infrequent intervals. During the past exceptionally severe winter, for instance, there were only 96 hours of zero weather in New York. The charts showed by months how the load requirements run up from the opening of the heating season to the peak load in January and down again through the spring months. These were supplemented with charts showing the corresponding proportion of coal requirements month by month, so that it was possible to check the coal used in a given building for any period. An alignment chart was then presented which could be applied to any building and the season's coal requirements read directly for varying outside or indoor temperatures, or both.

In discussing the charts George W. Martin, president of the National District Heating Association, told of the difficulty of obtaining results that would harmonize with theory and said that in a number of buildings where he had maintained records it was impossible to reconcile the coal used with any theory of what should have been required.

Mr. Ehrlich then explained that his charts were intended to form a basis so that in a given case where the coal consumption ran above the calculated amount, it would mean that something was wrong with the plant or its operation.

President P. H. Seward of the New York Chapter said he believed Mr. Ehrlich's paper marked an advance and while more or less modification might become necessary in the basis he had used, it was his opinion that in the years to come some such method would become common practice in the trade. The old days, he said, of uncertain heating plant operation were rapidly coming to an end and we are at the beginning of a conservation era that will put wasteful practices in the discard. He said that the days of sharp competition were about to return and he looked for a period that would tax the recources of the trade and profession to produce economical as well as correctly-designed apparatus.

Previous to Mr. Ehrlich's address stereopticon views were shown of "The American Soldier in the Making." President Seward then announced that the plans of the society's research bureau committee were being rapidly perfected and he called upon Mr. Lyle to tell of the progress of this work.

Mr. Lyle stated that some 2000 names of firms in the heating and ventilating line had been card indexed with an allotment placed alongside each name. The committee's plan calls for the raising of $10,000 each year for a period of five years to operate the bureau. No allotment, he said, would exceed $250.00 per year and that if the trade responded as was expected, the average allotment would be a nominal figure. Sub-committees have already been named to canvass the trade and in addition, Mr. Lyle stated that a number of the society's members including President F. R. Still, W. F. McDonald, of Detroit; E. E. McNair, of Detroit; H. M. Hart, of Chicago; and himself, were about to visit the principal cities in the middle west in the interests of the project. The campaign would be opened December 2 and would continue until January 18. Sub-committees have already been named to canvass the trade, that for the New York district being made up of Arthur Ritter, chairman, and Messrs. F. K. Chapman, J. A. Donnelly, C. E. Pearce, G. G. Schmidt, C. E. Scott and B. K. Strader.

Illinois Chapter Postpones Meeeting.

Owing to the influenza epidemic in Chicago the November meeting of the Illinois Chapter was postponed.

British Institution of Heating and Ventilating Engineers.

At the autumn meeting of the Institution of Heating and Ventilating Engineers, which was held at the Duke's Salon, Holborn Restaurant, London, October 8, a paper was presented by M. Kinoshita on "A New Method of Testing Heat Transmission from Radiators." The report of the institution's research committee was also considered, as well as extracts from the report dealing with "The Transmission of Heat Through Heavy Building Materials."

This investigation was conducted for the research committee of the Institution of Heating and Ventilating Engineers, with the aid of grants from the Department of Scientific and Industrial Research of the University of London, and the report was issued under the authorship of Arthur H. Barker, director of laboratory, and M. Kinoshita, assistant. The experiments described in the report were undertaken to develop standard methods of testing heat transmission through thick walls, to compare the transmission coefficients for different materials under precisely defined standard conditions, to verify the applicability of formulas in current use, and, finally, to measure the degree of variation in the amount of heat actually transmitted in different conditions through walls exposed on one side to the outside atmosphere.

The general principle of all the tests was to supply a measured quantity of heat per hour to an insulated enclosure bounded on one or more sides by the wall under test. The difficulties encountered were discussed at length. Owing to war conditions the only structure tested in Series 1 was an old 9-in. brick wall, plastered on the outside with ¾ in. of plaster. Heat was supplied to the interior of the insulated chamber by electrical means automatically regulated. Thirteen experiments were made, the values of K ranging from 0.59 to 0.25. The average was 0.401. The author's note that according to these tests the currently-accepted coefficients are some 25% too low if applied to an old wall. Also to provide for such wind and rain as was experienced in the extreme case, it is necessary to add about 45% to the mean rate of heat loss. General conclusions, however, it is stated, must await a far larger number of observations made in different parts of the country and extending over long periods.

A second series of tests was made to compare various materials of construction in respect of their heat transmission when placed in exactly defined and identical constant conditions. Two exactly similar walls were built of unplastered plain stock bricks, with Flemish bond, 6 ft. square by 9 in. thick, and were designed to be a standard against which all others were to be compared. Between these was clamped a strong double wooden case consisting of two complete hollow squares. All precautions were taken to have them tight. The general mean value of K in 14 independent tests was 0.421.

Owing to the inconvenience and expense attached to the form of test just mentioned a third series was made in which the previously-tested 9-in. wall was retained on one side of the combination and the second plain

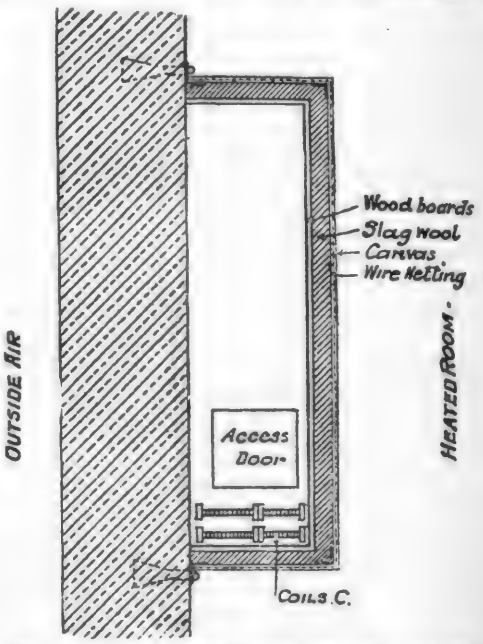


FIG. 1—CONSTRUCTION OF INSULATED CHAMBER USED IN SERIES I.

brick wall was replaced by a 9-in. match-boarded wall. The total amount of heat supplied to the inner chamber was divided between the two walls in proportion to the observed differences of temperature between the two faces of the wall on the two sides, the temperature being taken in the substance of the wall itself. The average mean value of the transmission coefficient of the match-boarded wall was found to be 0.25, which is some 10% below the value given by Rietschel for this combination. It was also brought out that a match-boarded wall 9 in. thick is equivalent approximately to a plain brick wall 21 in. thick.

The method used in Series III was not regarded as altogether satisfactory for general purposes since it involves auxiliary observations on a second structure not actually under test. In a new series that is now under way a further modification of the

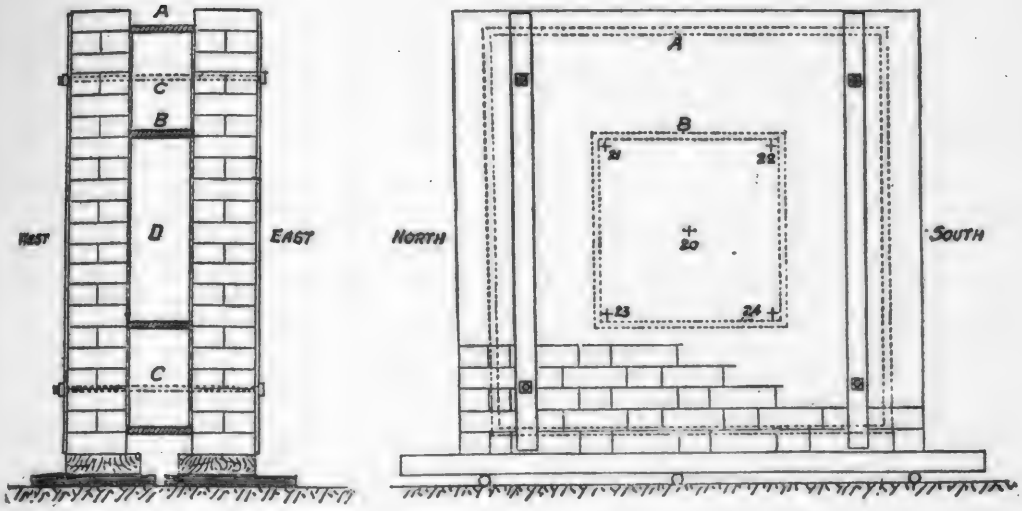


FIG. 2—CONSTRUCTION USED IN SERIES II.
(Numbers show positions of thermo-elements on outside surface of wall.)

"guard ring" method was devised by forming the inner chamber D of Fig. 2 as a completely enclosed case on the principle of Fig. 1. An outer casing was constructed completely enveloping the inner chamber. By this means the auxiliary wall was eliminated. The results of this test will be reported in a supplement to the present report.

Annual Meeting of American Society of Mechanical Engineers.

Dean Mortimer E. Cooley, of the University of Michigan, was elected president of the American Society of Mechanical Engineers, at its annual meeting in New York, December 3-6. Other officers elected were: vice-presidents, F. R. Low, New York; Henry B.

FIG. 3—BRICK WALL UNDER TEST (SERIES II) SHOWING ARRANGEMENT OF THERMOJUNCTIONS.

Sargent, New Haven, Conn.; and John A. Stevens, Lowell, Mass. Managers, Charles L. Newcomb, Holyoke, Mass.; F. O. Wells, Greenfield, Mass.; and Dean C. R. Richards, Urbana, Ill. Treasurer, William H. Wiley, New York.

New Publications.

FIVE WAYS OF SAVING FUEL IN HEATING HOUSES, by Henry Kreisinger, has been published by the Bureau of Mines as Technical Paper 199. These are given as:

1. Of the coals available in your market select the one that requires the least attention in burning.
2. Use an economical method of burning your coal.
3. Keep your house temperature 62° to 65° F., instead of 72° to 75° F.
4. Heat as few rooms as the comfort of your family will permit.
5. Shorten the heating season as much as possible. In firing anthracite the best results, it is stated, are obtained by spreading the coal evenly over the entire fuel bed. The fire should not be allowed to become too low before putting on a fresh firing. A fuel bed 5 to 10 in. thick gives good results. The fire should be disturbed as little as possible.

Briquets when properly made are recommended as very good fuel for house-heating purposes, but the supply is decidedly limited. When burning briquets the fuel bed should be kept 8 to 12 in. thick. The fresh charges should be spread evenly over the grate area. The fire must not be disturbed. Poking breaks the briquets and spoils the fire.

Semi-bituminous coals of the Pocahontas are described as good fuel for heating a house. They are nearly smokeless and make but little soot. For regular firing, the coal can be spread evenly over the entire fuel bed; or, it can be fired like bituminous coal, the fresh charges being placed alternately on one side of the grate and part of the surface of the fuel bed left uncovered. The alternate method should be used if the firings are heavy. The fire keeps better over night if the last firing is heaped to one side of the grate. Good results are obtained with fires 8 to 10 in. thick.

Bituminous coal should be fired by placing the fresh charge on one side of the grate only, leaving part of the surface of the fuel bed uncovered.

If the entire surface of the fuel bed is covered with a heavy charge, the volatile matter from the fired coal does not ignite for a considerable length of time after firing and passes away unburned as tarry, greenish-yellow smoke. The furnace and the flues become filled with the smoke and when the fire finally works its way through the fresh layer of coal the smoke and the gases may ignite with an explosion violent enough to blow the pipes down and fill the house with smoke. This method of firing reduces the amount of soot deposited in the flues so that less frequent cleaning is necessary; it also reduces the heat losses from incomplete combustion, thus directly effecting a saving of coal.

BOILER AND FURNACE TESTING, prepared by Rufus T. Struhm, associate editor of *Power*, is the title of Engineering Bulletin No. 1, issued by the Bureau of Conservation of the United States Fuel Administration. The bulletin takes up the essential elements only and includes an interesting tabulation on "What to Do" and "Why," arranged as follows:

WHAT TO DO.	WHY.
1. Close up all leaks in the boiler setting.	To prevent waste of heat due to excess air admitted.
2. Keep shell and tubes free from soot and scale.	To allow the heat to pass easily into the water.
3. Use grates suited to the fuel to be burned.	To prevent loss of unburnt coal through air spaces.
4. Fire often; and little at a time.	To obtain uniform conditions and better combustion.
5. Cover all thin spots and keep fire bed level.	To prevent burning holes in bed and admitting excess air.
6. Do not allow clinkers to form on side or bridge walls.	Because they reduce the effective area of the grate.
7. Keep the ash pit free from ashes and hot clinkers.	To prevent warping and burning out of the grates.
8. Do not stir the fire except when necessary.	Because stirring causes clinker and is likely to waste coal.
9. Use damper and not ash-pit doors to control draft.	Because less excess air is admitted by so doing.
10. See that steam pipes and valves are tight.	Because steam leaks waste heat and therefore coal.
11. Keep blow-off valves tight.	Because leaks of hot water waste coal.
12. Cover steam pipes and the tops of boilers.	To prevent radiation and loss of heat.

Copies of this bulletin may be obtained from any state administrative engineer as well as from Washington.

HOME HEATING, how to get the most out of a ton of coal is presented in a new bulletin of the Conservation Division of the United States Fuel Administration in which it is stated that from a sixth to a quarter of the coal used in the average home can be saved by proper damper control. Too much draft in the chimney, it is claimed, is responsible for half of the fuel losses in burning coal. Seventeen rules are given on "How to Beat the Chimney and Save Coal," as follows:

1. The secret of coal saving is just enough draft and no more.
2. Keep the cross damper in the chimney pipe as nearly closed as posssible.
3. Soft coal needs some draft through the fire-door, but not much.
4. When you wish to reduce the heat, do not use the damper in the fire-door. It wastes heat and coal. Use the chimney damper.

5. A freshly made fire requires an open chimney damper, but this damper should be closed almost entirely as soon as the fire has gained headway. There is danger of explosion of the gases, however, if the damper is closed before flame appears over the fire.
6. Stop up all cracks in the stove or furnace. They cause waste of heat.
7. Keep your flues and your heating surfaces clean. This is important.
8. Some persons clean their boiler flues and furnace heating surfaces once a year "whether they need it or not." Such people may waste from 50% to 75% of their heat. A quarter-inch layer of soot wastes from 10% to 20% of your fuel.
9. In soft-coal stoves and furnaces the flues should be cleaned twice a week.
10. In hard-coal stoves and furnaces the flues should be cleaned at least once a month.
11. Avoid poking and slicing the fire bed. It causes draft holes and clinkers.
12. Never shake a fire that is low until you have put on a little fresh coal and have let it start to burn.
13. Feed regularly, whether in warm or cold weather. Fill the fire pot. A thin fire wastes coal. Disturb the fire as little as possible.
14. Regulate the fire by the cross damper in the chimney pipe.
15. Put the furnace in repair. Every broken part means a loss of heat.
16. You can lose heat in the basement; you can lose heat throughout the whole house; you can lose heat by the window and the door, *but the chief waste is by the chimney.*
17. Study how to regulate your stove and your furnace, but with all your regulating, *regulate that chimney damper.*

Housewarming at New Plant of Buffalo Forge Company.

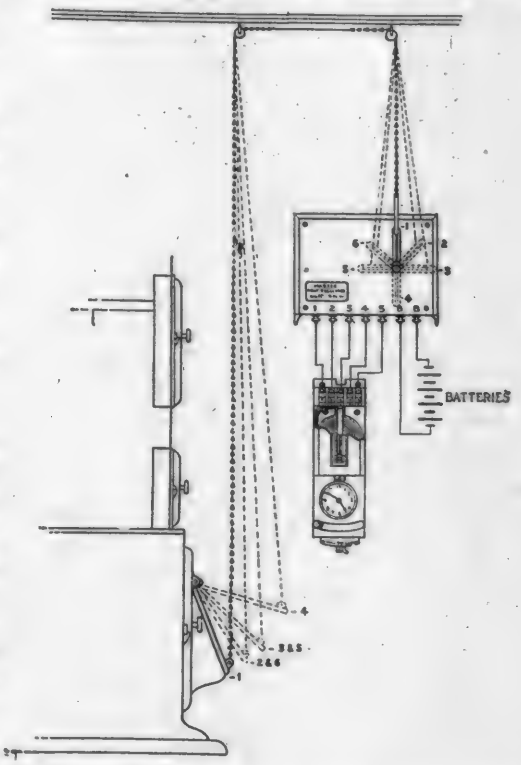
Something unique in the way of a factory opening was carried out by the Buffalo Forge Company on November 8 when a dance was given to its employees before the building was turned over to manufacturing purposes. The new machine shop, for such it is, is of the saw-tooth type of construction, with a number of large galleries supported on heavy steel beams. The floors are of wood, with a hardwood covering, making them, in their new condition, a delightful dance floor.

Nearly 1600 people were present, including employees and their friends. Cider, doughnuts and apples were served and a festive touch was added by the distribution of paper caps of various designs. It can well be imagined that this was a thoroughly democratic gathering inasmuch as the entire force from General Manager H. W. Wendt to the sweepers were there and all report a splendid time. It was particularly interesting to have the dance the day after the first peace rumor was received and just before the final signing of the armistice, so that it was an historical event on that score, as well as being a landmark for the Buffalo Forge Company.

The company is preparing to publish a shop paper as soon as its machine shop is properly organized.

Trade Literature.

MASTER HEAT REGULATOR, made by the Specialty Mfg. Co., St. Paul, Minn., is the subject of a recently-published circular. Its operation is described as different from that of any other heat regulator. The discs No. 1, shown in the illustration, are extremely sensitive to heat and cold. These discs, when expanding, cause the finger 2 to move to the right, and when contracting, to the left. The finger forms an electrical contact upon the segments 3, 4, 5 and 6. When



OPERATION OF MASTER HEAT REGULATOR.

in contact with segment 6 the motor causes the draft damper of the heater to close and the check to open wide. Contact with the other segments give varying degrees of control. There is an opening in the case of the thermostat which leaves the contact segments exposed to view. This is in order to indicate the position of the dampers. If by glancing at the thermostat the finger is found at the extreme left of segment 3, it is evident that the draft door is wide open and that the temperature has not come up as it should. This invariably means that the fire needs attention and thus one may determine the condition of the fire without making a trip to the basement.

KRAKER SIMPLEX COMFORT HUMIDIFIER INSTALLED.

Excelsior Smokeless Furnace, described as capable of burning soft coal of the cheapest grades without producing objectionable smoke, has been brought out by the Excelsior Steel Furnace Co., Chicago, Ill. It is

EXCELSIOR SMOKELESS FURNACE.

the subject of a special circular issued by the manufacturers. This heater is of the down-draft type and is furnished in four sizes with casing diameters ranging from 44 in. to 60 in.

Kraker Simplex Comfort Humidifer, designed for use in connection with a warm-air furnace, is a new device brought out by the Henry Kraker Co., Holland, Mich., and featured in newly-issued circular matter. It is described as completely automatic. It slips through an opening in the canopy of the furnace and rests directly on the dome and radiator. City water flows in at the valve in front and is regulated automatically by the float shown inside. The position of the front cover determines the amount of moisture supplied. The overflow pipe is shown at the left in front. A drain plug, not shown, is supplied with each humidifier, Special emphasis is laid on the way the amount of moisture given off may be regulated. Raising or lowering the outside door operates a damper at the back end of the hood through which the vapor passes into the hot air pipes.

Deaths.

James Minot Thayer, for 32 years president of the Thayer Heating Co., Randolph, Mass., and inventor of the Thayer hot-water heater, died at his home in East Greenwich, R. I., October 18. He was 75 years old. Mr. Thayer retired from business about ten years ago.

Henry F. Rosenow, manager of the heating department of Skinner Bros. Mfg. Co., St. Louis, manufacturer of the Skinner Bros. (Baetz patent) system of portable hot blast heating, died at his home in St. Louis, following an attack of typhoid-pneumonia. Mr. Rosenow addressed the heating engineers' society at its meeting last summer in Buffalo on the use of portable air heaters, especially for heating industrial buildings.

Henry T. Richardson, president of the Richardson & Boynton Co., New York, manufacturers of heating boilers and furnaces, died at his home in New York, November 17, after several weeks' illness. Mr. Richardson was 73 years old and had been connected with the business for over fifty years.

HEAT LOSSES FOR VENTILATED ROOMS.

The calculation of heat losses for ventilated rooms involves the omission of the leakage losses and the raising of the exposure factors about 10% as explained in detail on Standard Data Sheet No. 2. Owing to the leakage varying between one-half to two air changes per hour (usually approximating one air change) and the ventilation running from four to twenty air changes per hour (usually approximating six to eight air changes) the leakage in ventilating rooms becomes relatively of minor importance.

In ventilated rooms two conditions may occur: (a) the room may be supplied with 70° air and all the heat losses made up by direct radiation; or, (b), the air may be heated up to whatever degree is necessary to make up the heat losses. In the first instance the system is what is known as a combination "direct-indirect system" with the air supplied purely for ventilation purposes, while in the second case the air is supplied for heating as well as ventilating the system, in this event being usually termed a "hot-blast system" of heating.

Suppose the room taken for example in Standard Data Sheet No. 5-A (May, 1917, issue) is to be ventilated with air at 70° F. so as to give ten air changes per hour. What will be the size of direct radiator, the number of cubic feet of air per minute, the area of the duct and the gross area of the register?

According to the summary of heat losses presented in Standard Data Sheet No. 5-A these losses for a ventilated room will be:

4820	B. T. U. for outside wall and glass
1205	B. T. U. for exposure (increased to 25%)
3630	B. T. U. for inside wall and glass
2520	B. T. U. for ceiling
0	B. T. U. for leakage
12175	B. T. U. for total loss

The 12,175 B. T. U. may be reduced to direct radiator surface, as outlined in Standard Data Sheet No. 13, and the quantity of air per minute may be determined by the use of the formula:

$$\frac{CF \times C}{60} = C.\ F.\ M.$$

When C. F. M. is the cubic feet per minute required.
C F is the cubic feet contained in the room.
C is the number of air changes per hour.
Then

$$\frac{2800 \times 10}{60} = 466 \text{ cu. ft. per minute.}$$

At a velocity in the entering duct of, say, 400 ft. per minute, the area of the duct will be 466/400 = 1.16 sq. ft. and the net area of the register, at 250 ft. per minute velocity, will be 466/250 = 1.86 sq. ft., which must be increased about 50% to get the gross area 1.86 + (1.86 x .50) = 1.86 + 0.93 = 2.79 sq. ft. gross area.

The heat required for this air may be calculated by the use of the formula:

$$B.\ T.\ U. = \frac{60\ CFM \times R}{50}$$

When B. T. U. is the heat required per hour.
C F M the cubic feet of air per minute.
R the rise in temperature in the air.
Then

$$B.\ T.\ U. = \frac{60 \times 466 \times 70°}{50} = 39144 \text{ B. T. U.}$$

This added to the B. T. U. for direct radiation makes a total of

12175	B. T. U. for direct radiation.
39144	B. T. U. for ventilation.
51319	B. T. U. total

HEAT LOSSES IN HOT BLAST HEATING.

If the room is to be heated by the air, as well as ventilated, then the temperature of the air must be raised sufficiently above 70° so that the *surplus* heat in the air will be sufficient to make up the radiation losses of the room. Usually 120° to 140° is considered as the practical limits of heating the air so that when the temperature of the air would have to exceed this it is customary to increase the quantity of air on *account of the heating requirement.*

Under ordinary conditions the quantity of air required for ventilation is more than sufficient to supply the necessary heat and this is found to be the case in the example cited, as is later demonstrated.

The amount of air heated 1° F. by 1 B. T. U. varies slightly at different tempratures and humidities, as is shown in the two right-hand columns of the table giving the "properties of Air" published on Standard Data Sheet No. 9. It is quite usual, however, to consider that 50 cu. ft. may be raised 1° F. with 1 B. T. U. or that 1 cu. ft. may be raised 50° F. by 1 B. T. U. While this is not absolutely correct it is entirely close enough for all ordinary work and facilitates the calculations; when greater accuracy is desired 55 may be substituted for 50.

In the room in question (see Data Sheet No. 5-D) it has been determined that the heat loss is

12175 B. T. U. per hour

and the air per hour is 466 x 60, or

27960 c. f. h.

The increase in air temperature may be calculated from the formula

$$I = \frac{\text{B. T. U.}}{\text{C. F. H.}} \times 50$$

When I is the increase in temperature in degrees above the room temperature and B. T. U. and C. F. H. are the B. T. U. loss and cubic feet of air supplied,—both per hour.

When the increase in air temperaure must be

$$I = \frac{12175}{27960} \times 50 = 21° \text{ plus, say } 22° \text{ F.}$$

As the room temperature is 70° then the air temperature will be 70 + 22 = 92° in order to heat the room.

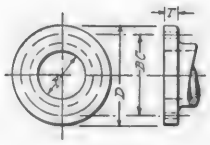
Proof: During the course of one hour 27,960 cu. ft. of air enter the room. Each cubic foot cools from 92° down to 70° (the room temperature), or 22°. As each cubic foot would have to cool 50° in order to give up 1 B. T. U. in cooling 22° it gives up only 22/50 B. T. U. or 0.44 B.T.U. 27950 cu. ft. x 0.44 B. T. U. = 12,300 B. T. U. supplied, against 12,175 B. T. U. required.

The total quantity of heat is then

60 x 466 x 92/50 = 51200 B. T. U.

if the air is assumed to be heated from zero.

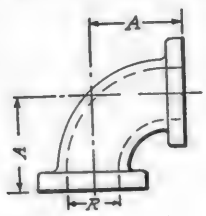
1915 STANDARD EXTRA HEAVY PIPE FLANGES AND BOLTS.



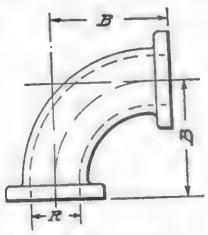
250 LBS. WORKING PRESSURE

Pipe Size	FLANGE Dia.	FLANGE Thickness	BOLTS No.	BOLTS Size	BOLTS Bolt Circle	BOLTS Bolt Hole
P	D	T			B.C.	
1	4½	11/16	4	½	3¼	⅝
1¼	5	¾	4	½	3¾	⅝
1½	6	13/16	4	⅝	4½	¾
2	6½	⅞	4	⅝	5	¾
2½	7½	1	4	¾	5⅞	⅞
3	8¼	1 ⅛	8	¾	6⅝	⅞
3½	9	1 3/16	8	¾	7¼	⅞
4	10	1 ¼	8	¾	7⅞	⅞
4½	10½	1 5/16	8	¾	8½	⅞
5	11	1 ⅜	8	¾	9¼	⅞
6	12½	7 1/16	12	¾	10⅝	⅞
7	14	1 ½	12	⅞	11⅞	1
8	15	1 ⅝	12	⅞	13	1
9	16¼	1 ¾	12	1	14	1⅛
10	17½	1 ⅞	16	1	15¼	1⅛
12	20½	2	16	1⅛	17¾	1¼
14	23	2 ⅛	20	1⅛	20¼	1¼
15	24½	2 3/16	20	1¼	21½	1⅜
16	25½	2 ¼	20	1¼	22½	1⅜
18	28½	2 ⅜	24	1¼	24¾	1⅜
20	30½	2 ½	24	1⅜	27	1½
22	33	2 ⅝	24	1½	29¼	1⅝
24	36	2 ¾	24	1⅝	32	1¾
26	38¼	2 13/16	28	1⅝	34½	1¾
28	40¾	2 15/16	28	1⅝	37	1¾
30	43	3	28	1¾	39¼	1⅞
32	45¼	3 ⅛	28	1⅞	41½	2
34	47½	3 ¼	28	1⅞	43½	2
36	50	3 ⅜	32	1⅞	46	2
38	52¼	3 7/16	32	1⅞	48	2
40	54½	3 9/16	36	1⅞	50¼	2

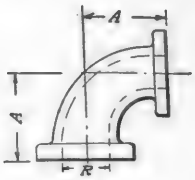
1915 STANDARD EXTRA HEAVY ELBOWS AND REDUCERS.



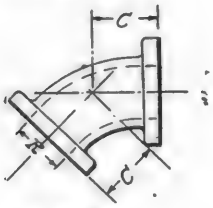
Elbow.



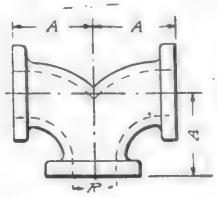
Long-TurnElbow.



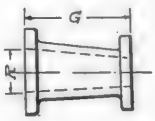
ReducingElbow.



45° Elbow.



Double-Branch Elbow.



Reducer.

250 LBS. WORKING PRESSURE

Size	Dimensions				Flange	
R	A	B	C	G	Dia.	Thickness
1	4	5	2	—	4½	11/16
1¼	4¼	5½	2½	—	5	¾
1½	4½	6	2¾	—	6	13/16
2	5	6½	3	—	6½	⅞
2½	5½	7	3½	—	7½	1
3	6	7¾	3½	6	8¼	1 ⅛
3½	6½	8½	4	6½	9	1 3/16
4	7	9	4½	7	10	1 ¼
4½	7½	9½	4½	7½	10½	1 5/16
5	8	10¼	5	8	11	1 ⅜
6	8½	11½	5½	9	12½	1 7/16
7	9	12¾	6	10	14	1 ½
8	10	14	6	11	15	1 ⅝
9	10½	15¼	6½	11½	16¼	1 ¾
10	11½	16½	7	12	17½	1 ⅞
12	13	19	8	14	20½	2
14	15	21½	8½	16	23	2 ⅛
15	15½	22¾	9	17	24½	2 3/16
16	15½	24	9½	18	25½	2 ¼
18	18	26½	10	19	28	2 ⅜
20	19½	29	10½	20	30½	2 ½
22	20½	31½	11	22	33	2 ⅝
24	22½	34	12	24	36	2 ¾
26	24	36½	13	26	38¼	2 13/16
28	26	39	14	28	40¾	2 15/16
30	27½	41½	15	30	43	3
32	29	44	16	32	45¼	3 ⅛
34	30½	46½	17	34	47½	3 ¼
36	32½	49	18	36	50	3 ⅜
38	34	51½	19	38	52¼	3 7/16
40	35½	54	20	40	54½	3 9/16

TRADE AND MISCELLANEOUS NOTES

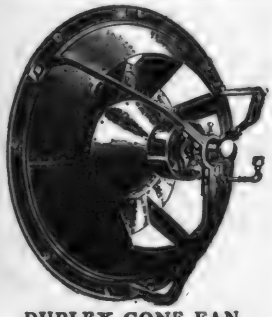
Coming Events.

January 28-30, 1919.—Annual meeting of The American Society of Heating and Ventilating Engineers. Headquarters at the Engineering Societies Building, New York. Secretary, C. W. Obert.

Miscellaneous Notes.

Chicago, Ill.—In a recent statement on the heating and ventilation of Chicago's surface cars, Leonard A. Busby, head of the Chicago surface lines, said: "Two years ago the company installed a ventilating system on every car not then equipped with mechanical ventilators. This system was first submitted to and approved by the Department of Health and is admitted to be the best system of ventilation known at the present time. Keeping the cars heated to 50° F. is not even an ordinance requirement. This provision was superseded by the more practical provisions of the unification ordinance which recognized the impossibility of keeping a temperature of 50° F. in a car when the temperature outside is down to zero or 5° above. Furthermore, every car on the system is now equipped with thermostatic regulators. This, with a well-ordered system of pre-heating the cars before they go into service, has resulted in an elimination of almost all complaints on this subject." The statement was part of a reply made to a communication from the mayor that the company was at fault in certain items.

Philadelphia, Pa.—A servey of fuel efficiency of the heating plant in the State Capitol and other State buildings in Harrisburg is to be made by a committee named



DUPLEX CONE FAN
Belt Driven

HOWARD & MORSE
45 FULTON ST., N. Y.
Ventilating Engineers and Contractors
MANUFACTURERS OF
BLACKMAN and DUPLEX CONE FANS
which are installed by us complete with **Motors, Duct Work** and **Wiring.**

Aligning, Rigging and **Hoisting** done, with labor thoroughly qualified from long experience.

We make a specialty of **Kitchen Exhaust** work. Prominent buildings, hospitals, theatres, and private residences are among our many and recent installations.

The **Duplex Cone** Fans are semi-conoidal fans, made especially to operate against pressure in duct systems.

The **Blackman** Fans are used for fresh air delivery and in duct systems, when no great pressure is involved.

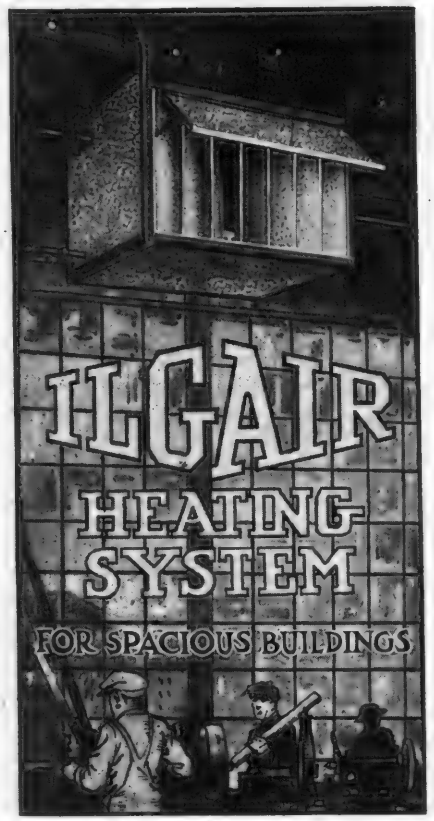
You can have the advantage of our experience.
SEND FOR CATALOGUE

BLACKMAN FAN
Direct Connected to Motor

by the superintendent of public grounds and buildings at the request of the U. S. Fuel Administration. The committee is headed by L. R. Palmer, commissioner of labor and industries and includes C. P. Turner, Steelton; John C. Reed, Bethlehem; and T. F. Folz, of the Department of Labor and Industry.

Central Supply Association, whose meeting November 20 in Chicago was one that had been postponed on account of the influenza epidemic, and which had been designed to be a war convention, turned out to be an enthusiastic reconstruction meeting. At the opening session word was received from Andrew Wheeler, chief of Bureau of Warehouse Distribution that "effective at once all restrictions on sales and purchases by jobbers are hereby abolished. Warehouse prices, however, must be maintained. No reports of sales are required. Material may be sold by jobbers for any purpose whatever."

In considering the proposal work of the Trade Extension Committee, the association voted to contribute its pro rata share in putting into effct the ducational campaign proposed by the publicity committee. Following are the officers elected: President, J. R. Steneck; first vice-president, C. V. Kellogg; second vice-president, A. Y. McDonald; treasurer,



ILGAIR
UNIT HEATERS

Offer a new method of heating big spaces

The installation is simple
First cost is low
Installation can be made very quickly
Power consumption very low
System has great flexibility
As good for cooling in summer as for heating in winter

Ideal for heating new war plants with rush orders

Very quick shipments for direct or indirect government work

Write for descriptive bulletin

ILG ELECTRIC VENTILATING CO.
158 WHITING ST., CHICAGO, ILL.
Branches—All Large Cities

HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINERY

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

DETROIT PACKLESS RADIATOR VALVES

The Correct Radiator Valve for Vapor Heating

The Detroit Packless Vacu Valve is a Graduated Valve for Vapor and Vacuum Systems of Heating. The dial plate is provided with a series of holes and a movable pin. This pin acts as a stop for the handle pointer and is inserted in the hole in the dial nearest the point at which the valve, when opened, admits only sufficient vapor or steam to fully supply the radiator.

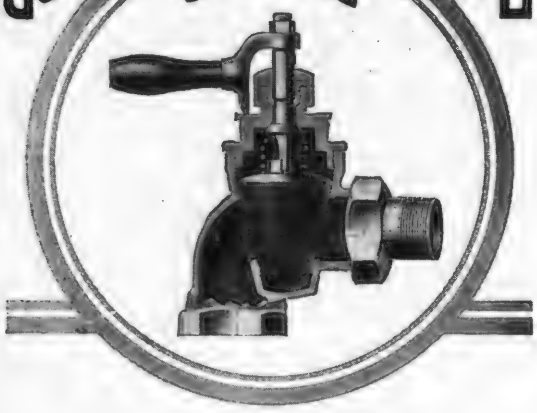
DETROIT PACKLESS
Vacu Valve showing Dial Plate and Lever Handle

Booklet VP-1 Gladly Sent Upon Request

DETROIT LUBRICATOR COMPANY
DETROIT, U. S. A.
CANADIAN DETROIT LUBRICATOR COMPANY, LTD. WALKERVILLE, ONTARIO

LARGEST MANUFACTURERS OF RADIATOR VALVES IN THE WORLD

GORTON QUICK VALVE OPENING



Would you use a door knob that required five or six turns of the wrist to open a door?

Then why use a valve that requires nine or ten turns of the wrist to operate?

A quarter turn of the wrist opens or closes the Gorton Valve.

This makes it easy to operate the valve and radiators will then be shut off when heat is not required, and that means

Saving Coal

It is a valve that is made tight and stays tight.

Write for Catalogue telling how it is done.

See SWEET'S CATALOGUE for Specifications

GORTON & LIDGERWOOD CO.

100 Liberty Street

New York, N. Y.

Edward F. Niedecken; secretary, Paul Blatchford.

San Antonio, Texas.—Work was to have begun by November 1 on the new $100,000 central heating plant for the base hospital at Fort Sam Houston.

Manufacturers' Notes.

Richmond Radiator Co., New York, has appointed A. H. Schroth as manager of the company's western office, with headquarters at 413 Rush St., Chicago. Mr. Schroth has recently returned from California where he went for his health.

Speakman Company, Wilmington, Del., is the changed title of the Speakman Supply & Pipe Company. There will be no change in the policy or personnel of the company, according to an announcement of the president of the company, W. A. Speakman.

Patterson-Kelley Co., New York, manufacturers of hot-water service and convertors, has moved its Philadelphia office to the Harrison Building, Fifteenth and Market Streets. Frank F. Glenn is sales manager for the Philadelphia district.

Detroit Valve & Fittings and Detroit Brass Work, Detroit, Mich., has completed a one-story addition to its plant, measuring 75 x 150 ft., which will be used for office and stock rooms.

Bridgman Bros. Co., Philadelphia, manufacturer of steam supplies, has filed plans for a one-story brick addition, 17 x 128 ft.

National Electric & Welding Co., 90 West St., New York, has been appointed New York sales agents for the C. & C Electric & Mfg. Company and has also been appointed eastern sales agents for the Wesche Electric Co., of Cincinnati. The personnel formerly connected with the New York sales

Steamo and Vapo Air Moisteners

For Residence, Apartment, Office and every Industrial Service

The Air Moistener Co.

28 N. Market St. Chicago, Ill.

office of the C & C Electric & Mfg. Company is now handling both C & C and Wesche machinery, these lines of apparatus having been extended to include A. C. and D. C. equipment, arc welders, etc.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., reports an oversubscription by its employees in the fourth Liberty Loan. The grand total for the Westinghouse interests was $6,500,000 for its 45,000 employees, of which amount approximately $5,500,000 was subscribed by employees of the Westinghouse Electric & Mfg. Company and its subsidiaries. A feature of the company's campaign was a large victory arch erected in Fifth Avenue, Pittsburgh, with thermometers on the supports which registered the cash subscriptions.

Central Station Heating Notes.

Springfield, Ill.—Authority to increase its rates for hot-water heating to an amount equal to 20% of its rates in effect during 1917-1918, the increase being on the base rate under which each consumer received service, has been granted the Public Utilities Company of Northern Illinois by the Illinois Public Utilities Commission. The increase is temporary and is subject to revision. If the commission should order the

If You Have Not a Set of Our Catalogs, Get It Today

It is more than a catalog—it is a text book on Instruments for Indicating and Reading Pressure, Vacuum Draft, Temperature, etc.

Write for Special Catalog Set HV Today

The Schaeffer & Budenberg Mfg. Co.
BROOKLYN, N. Y.

Chicago Pittsburgh Washington
St. Louis Philadelphia Los Angeles

Also many other Allied Instruments, Gauge Boards and Complete Equipment

They Never Need Attention

FIVE minutes to regulate a radiator trap doesn't sound very costly. But if there are 500 traps in the building, and each needs attention, then it's over 40 hours' time—and it comes right out of your profits.

That's just one of the ways you save money by installing Johns-Manville Radiator Traps. No valve, seat, or thermostatic adjustments required or possible, and chances for trouble are cut to the limit. No expanding liquids, no springs, no restricted air passage; no steam leakage or air binding.

Just three parts—body, ball and connection union. Nothing to wear out—nothing to be tampered with. Its record in service will give you some new ideas on trap economy. Better get the details.

H. W. JOHNS-MANVILLE CO.
New York City
10 Factories—Branches in 63 Large Cities

Johns-Manville Radiator Trap

rates lowered, the company is to make a refund of the excess rates collected, with interest at 6% per annum. The company operates plants in a number of cities in northern Illinois.

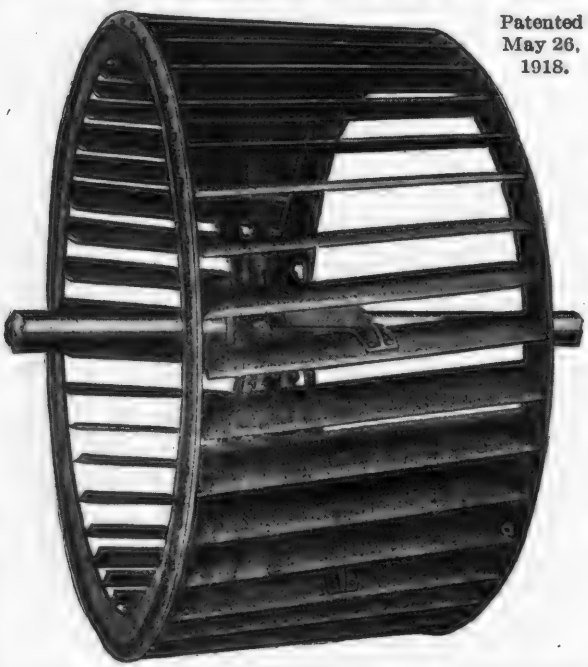
Hillsboro, Ill.—The State public utilities commission has approved the schedule for steam heating service in Hillsboro submitted by the Southern Illinois Light & Power Company. The new schedule, which has been suspended on several occasions, increases the former rate about 50%, and will remain in effect until May 1, 1919.

Waukegan, Ill.—The public service company's rates in Waukegan have been raised to 33.33c. gross per square foot per season. Twenty consumers in Waukegan are affected.

Taylorville, Ill.—The heat consumers of Taylorville and the Southern Illinois Light, Heat & Power Company have come to an agreement whereby during the period from September 1, 1918, to May 31, 1919. the company agrees that it will charge and bill monthly and consumers agree to pay regular meter rates fixed by the public utilities commission and that no meter charge will be make that will make the total monthly payments of each consumer in excess of his flat rate, plus 60% of said rate. The consumers agree to pay the company for service due January 1, 1918 to July 1, 1918, at flat rates and, in addition, 50% of said flat rate.

Lima, O.—Rates put into effect by the Ohio Electric Railway Company October 1 for steam heat supplied to 110 Lima buildings, have been sharply reduced by the Lima city council which passed a price-fixing ordinance giving the company a flat increase of 25% over last year's rates. The new ordinance also directs the company to maintain a pressure of 7 lbs. on its mains. The schedule put into effect by the company included increases ranging from 10% to 50%, based on the amount of radiation in the buildings. The change will cause small consumers to pay more for actual condensation used than under the companys' rates, but will still save them money, as the service charge is eliminated. The service charge amounted to $15.00 per month on 1000 sq. ft. of radiation, regardless of whether the consumer was using his radiation during the month. The new ordinance fixes the rate for consumers using up to 50,000 sq. ft. of condensation monthly at 62½c. The company had put into effect a 55s. rate, a 10% increase from last year. Other rates follow, the first being the city council's rate, the

THE NEW IMPROVED **Cycloidal Multivane Wheel**



Patented May 26, 1918.

For Heating and Ventilating

The vanes are curved forward, and set at an angle to the shaft, (patented feature) allowing uniform, unrestricted flow of air across entire width of wheel.

Highest Efficiency

Noiseless and Durable

Write for further details

Garden City Fan Co.
Est. 1879
CHICAGO, ILL.
Eastern Representatives:
L. J. WING MFG. CO., New York

Sirocco"
TRADE MARK

Speeds Up Production

In these days of rush work, with everything strained to the limit, fresh pure air for the factory is of vital importance.

The Sirocco System of Heating and Ventilating is used by many of America's best known and most successful manufacturers.

The view above shows an installation in a factory noted for its production and efficiency methods.

In the "dog days" of summer the Sirocco System is invaluable in keeping the factory workers fresh and fit by supplying the proper amount of fresh, pure air to every nook and corner.

Let us tell you more about Sirocco for your factory—Ask for Bulletin No. 270.

American Blower Company

DETROIT, MICHIGAN

BRANCHES IN ALL PRINCIPAL CITIES

second that put into effect by the company, and the third the rate in effect last year:

50,000 to 100,000 sq. ft.....50c. 45c. 40c.
100,000 to 400,000 sq. ft.....44c. 40c. 35c.
All over 400,000 sq. ft.....25c. 30c. 25c.

The new price ordinance supplements the company's franchise which did not fix the rates.

New Incorporation.

Victor Valve Co., Herndon, Va., capital $50,000, to manufacture valves and other specialities. The company's headquarters are at 1115 Fourteenth St., N. W., Washington, D. C. Fred C. Stelzer is president.

For Sale.—Immediate delivery, second-hand, first-class working condition, one American blower fan, 160 inches, steel-housed, paddle-wheel type, top-horizontal discharge. Capable of delivering 50,000 cubic feet of air at 160 R. P. M., directly connected to 9-in. x 12-in. steam engine.

One set of steam heating coils listed with American Blower Company, No. 40 base, four rows. Each section has a heating surface of 567.8 square feet, in good condition. These coils are used in connection with the above fan for heating. Address International Fabricating Corporation, Wilkes-Barre, Pa.

PIPE BENDING, MARINE EQUIPMENT AND REPAIR WORK
HEATING AND VENTILATING

The Ohio Heating and Pipe Bending Co.

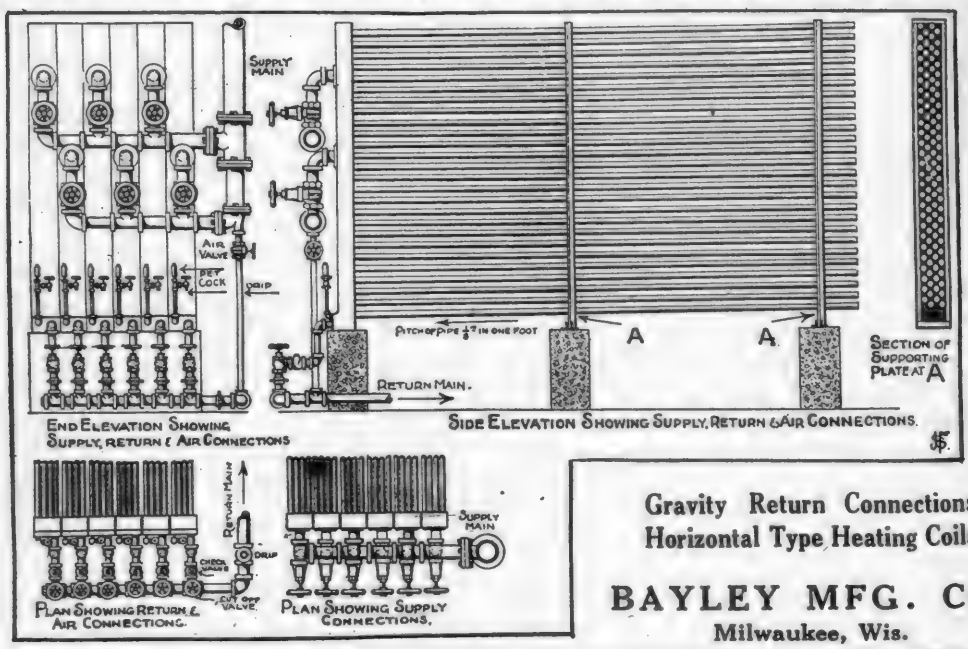
Main Office and Factory
1061-63 West 11th Street
Cleveland, Ohio

SOLE AGENTS
F. J. Nice Oil Burners and Combination Oil and Gas Burners

Main 2803

CHINOOK HEATERS

Give Positive Circulation. No Unequal Expansion and Contraction. Highly Efficient.



Gravity Return Connections, Horizontal Type Heating Coils

BAYLEY MFG. CO.
Milwaukee, Wis.

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

SKINNER BROS.
-BAETZ PATENT-
HEATING SYSTEM

Most Efficient and Economical

SKINNER BROS. (Baetz Patent) Heating Systems are giving unqualified satisfaction in hundreds of installations. Practical use has demonstrated they meet the test under all conditions. Names of prominent users will gladly be sent on request.

Save Money, Fuel and Floor Space

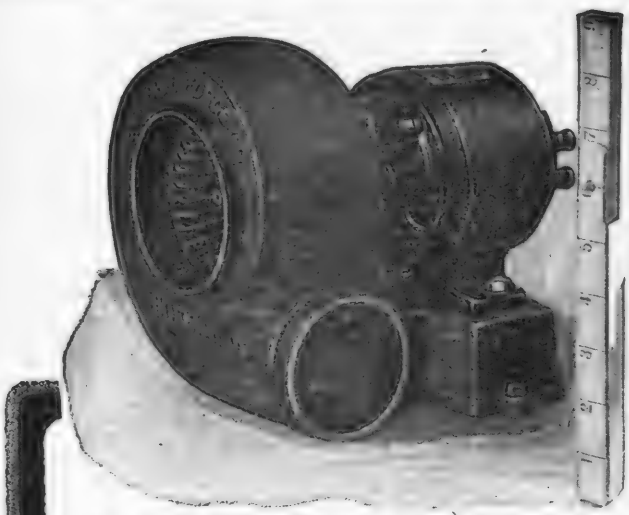
Each heater is a separate and complete unit—simple, substantial, easily accommodated to your present floor arrangements. Heaters contain a series of enclosed steam coils operating in connection with a powerful air fan which circulates the air direct to all parts of the room. No draft—no conducting pipes—only the directing elbow as shown in the illustration. Uses exhaust or live steam. Heats—ventilates—and quickly clears the air of steam and vapors. Always ready—always on the job—lowest in repair expense.

Sold Under Positive Guarantee

Try it in your own plant. Judge it for yourself. Engineer's estimate upon your individual requirements gladly furnished. Write today for illustrated booklet of specifications and testimonials of users.

SKINNER BROS. MFG. CO.
1016 Tyler St. St. Louis, U. S. A.

The more difficult or unusual your heating problem, the more desirous we are to show you how easily and economically it can be solved.



"Buffalo"

Baby Conoidal Fans

For ventilating offices, banquet rooms, club rooms, lavatories, staterooms, etc.,—there's practically no limit to its application.

Compact—Noiseless

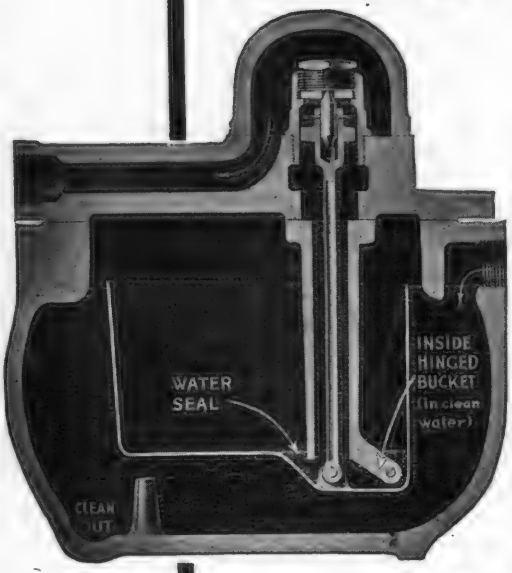
—adjustable discharge—low power consumption—three sizes.

Write for Catalog 182-E-36

BUFFALO FORGE COMPANY, Buffalo, N. Y.

To Help You Save Coal

THE SWARTWOUT *Hydromatic* Trap



The need to save coal is imperative. Every effective means to that end must be adopted by every user of coal.

Swartwout Hydromatic Traps are one very effectual means for coal saving. They will seal your coils and heaters, preventing all loss of steam, at the same time discharging all condensate. They pay big dividends.

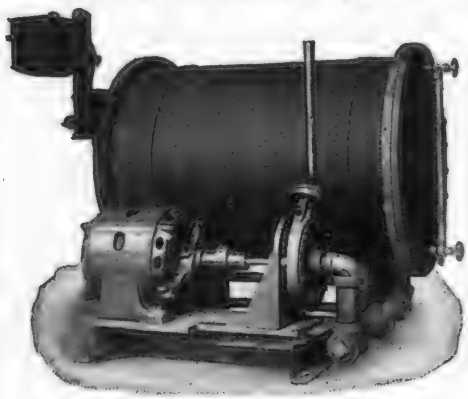
Write today and find out all about these coal savers

THE OHIO BLOWER CO.

9211 Detroit Avenue **Cleveland, Ohio**

WAR-TIME ECONOMY

demands the use of fuel-saving devices



ARCHITECTS AND ENGINEERS designing new plants generally provide for economical equipment, but there are many existing low pressure steam heating plants where a surprising amount of fuel could be saved by the installation of

Yeomans Electrically Operated Condensation Return Pumps

Made in Horizontal and Vertical Types for automatic operation

Send for Bulletin C-5000. Agents in all principal cities.

YEOMANS BROTHERS CO.
223 Institute Pl. Chicago, Ills.

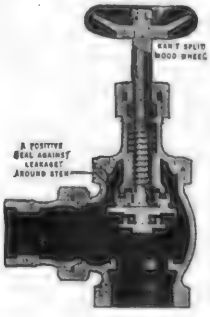
MARSH

UNION BONNET DOUBLE SEAT

VALVES

For SCREWED BONNET Pattern and detail UPPER SEAT feature, see CUT PAGE 100, September issue.

For GATE LINE see OCTOBER issue.



While we manufacture a FULL LINE of HIGH PRESSURE MILL SUPPLY Valves, GLOBES, ANGLES, and GATES, we SPECIALIZE on RADIATOR Valves and furnish ALL PATTERNS, — GLOBES, ANGLES, CORNER and BACK OFFSETS, PACKLESS, MODULATED and GATES complete.

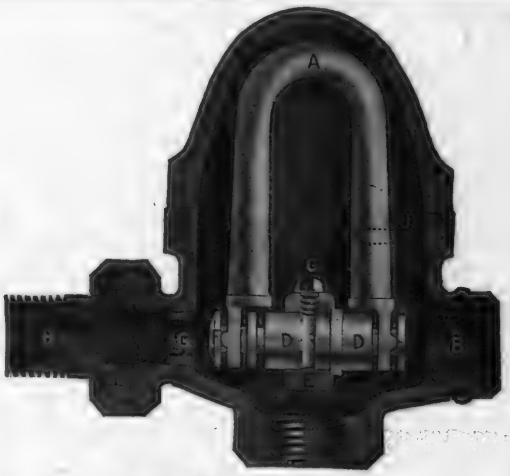
Let us send you catalogue and discount

MARSH VALVE COMPANY, Erie, Penna.

Haines Vento
Automatic
Valves and Traps

do not depend on gravity but are operated by Nature's greatest forces, expansion and contraction.

In all cases the operating power consists of a specially designed Haines thermostatic tube mounted vertically on a horizontal valve motion.



HAINES VENTO TRAP
Recommended for use with cast iron radiation with low pressure steam. Not exceeding 10 lbs.

Guaranteed for 5 years and backed by 18 years of successful use.

Our Catalog explains in detail the principle of construction and operation of this valve.

WM. S. HAINES & CO., Philadelphia, Pa.

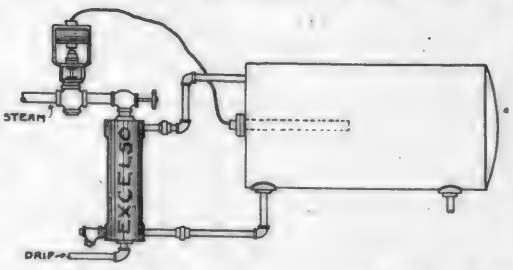
EXCELSO HEATERS FOR STORAGE TANKS

Large Heating Surface
Quick and Efficient

The Heater may be connected in many different ways to storage tanks and may be used with or without thermostatic control. It may also be used with or without the storage tank, either singly or in multiples with or without thermostatic control.

Sizes to fit all conditions

. Send for new circular just out



EXCELSO SPECIALTY WORKS, Henkel Bldg., Buffalo, N. Y.

Automatic Electric Condensation Pump and Receiver

The Best Pump for the Least Money

Automatically returns condensation from heating systems direct to boiler. Radiators on level with boiler room floor drained perfectly. Trapped connections in old systems kept absolutely free. Get results and save 25% in fuel and labor by using the Economy Condensation Pump. It will lift water from connections trapped as much as twelve inches, when so ordered.

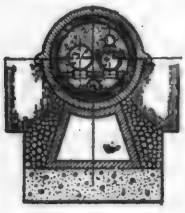
We make all sizes of Return and Air Line Vacuum Pumps, Bilge or Sump Pumps, also Hot Water Circulating Pumps.

Write for "ECONOMY MANUAL A." Most complete Vest Pocket Heating, Ventilating Engineer's Hand Book. This $1.00 publication mailed free on request.

ECONOMY PUMPING MACHINERY CO.
122 North Curtis St., Chicago

WANTED.

Help Wanted.—Designer and estimator for heating, ventilating and power apparatus. Permanent position in New York City for accurate, capable man, thoroughly familiar with large, high-class installations. State fully experience, qualifications, age and training. Salary $3,000. Address W. K., care of HEATING AND VENTILATING MAGAZINE.



RIC-WIL METHOD

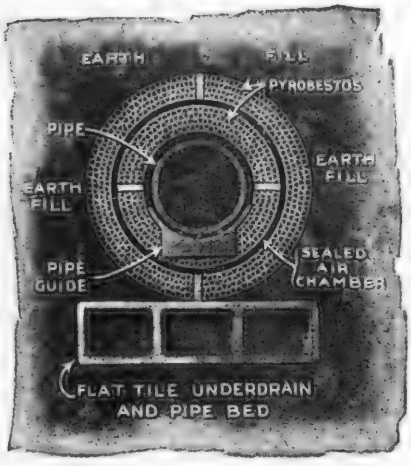
OF

Insulating Underground Steam and Hot Water Pipes

Send for Catalogue

THE RIC-WIL COMPANY
CLEVELAND

PYRO-BESTOS



Underground Pipe Insulation

For piping from central heating or power station to detached buildings of Universities, Asylums, Hospitals, Factories, etc. Also an underground Pipe Conduit for heating private Auto garages direct from House heating system.

Cannot rot or decay nor will it retain moisture to rust and destroy the piping during non-heating season.

Saves most coal, sends heat hotter and to a greater distance and by reason of its advanced common sense method of installation is at the same time a lower cost per foot of pipe covered than any other underground pipe Insulation on the market.

National Air Cell Covering Co.

Henderson St., South of Grand St., Jersey City, N.J.

MANUFACTURERS OF

Equipment and Supplies

FOR

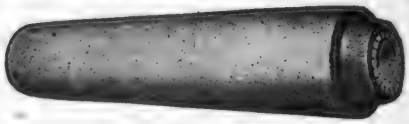
Central Station Heating Plants

Copper Diaphragm Expansion Joints, Slip Joints, Anchor Crosses, Line Anchors, Collars, Manhole-Curbs, Pipe Guides, and The Detroit Condensation Meter

THE DETROIT FEED WATER METER

Central Station Steam Co., Detroit, Mich.

STANDARD Steam Pipe Casing



For Insulating Underground Steam Pipe. Tin Lined, or Unlined.

Every salesman has his argument in order to sell the product he represents. Listen to our argument, be the judge, and you will find same not theoretical but practical, and from actual experience.

When you cover your steam line with our make of casing you have the assurance that the line will be constructed so that no heat will escape, and will be water tight as well, with ample space for air chamber.

Should occasion arise that it is necessary to get at the steam pipe, our covering CAN BE TAKEN APART WITHOUT DESTROYING THE STAVES in the sections of casing, and the same casing can be used again. LET US EXPLAIN HOW.

If your line runs in different branches we will build the casing in exact lengths so that you will not have to cut any sections, which means no waste or extra expense to you.

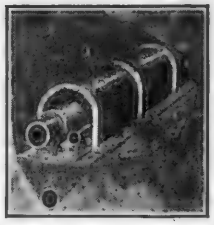
Our method of building covering will be to your interest. Our product is right, attention prompt, and prices low.

SEND FOR BOOKLET

Standard Wood Pipe Co.
WILLIAMSPORT, PA.

CENTURY!

Why Longer???



Economy
Durability
Accessibility

Catalogue and prices on application

CENTURY CONDUIT CO.
5602 Baum Blvd. Pittsburgh, a.

When Distress Calls the Red Cross Answers "HERE!"

NOW the Red Cross calls! The annual Christmas Roll Call of members will echo throughout the land the week of December 16th to 23rd.

Membership in the Red Cross now is more than duty—it is an honored privilege, and an evidence of loyalty. When that Roll is called, your conscience, your sense of right and justice, your love of country and your devotion to the highest ideals of unselfish service all suggest that you answer "HERE!"

All you need is a heart and a dollar

These entitle you to membership for one year.

When you wear your button, signifying that you are a member, you will not be asked to join again this year—it means that you have answered the Roll Call.

Join—be a Christmas member—but just join once.

Our soldiers and sailors look to the Red Cross for comforts. They have never been disappointed.

The Red Cross looks to you for the moral support of your membership. Answer "HERE!" when the Roll is called.

Join the Red Cross

Contributed through Division of Advertising

United States Gov't Comm. on Public Information

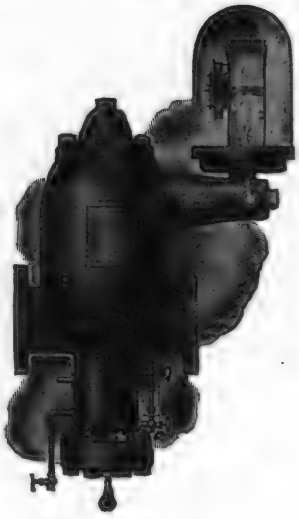
This space contributed by

THE HEATING AND VENTILATING MAGAZINE

1918

Wear Your Button

Fly Your Flag



"We've Done Our Bit"

WHY NOT CONSERVE COAL

by installing a St. John indicating and recording steam meter and conserve your coal pile

Be able to locate the waste (if any) and to know the amount of steam you are supplying to the various departments of your plant.

Manufactured in sizes 1 to 6 inch

Write for information

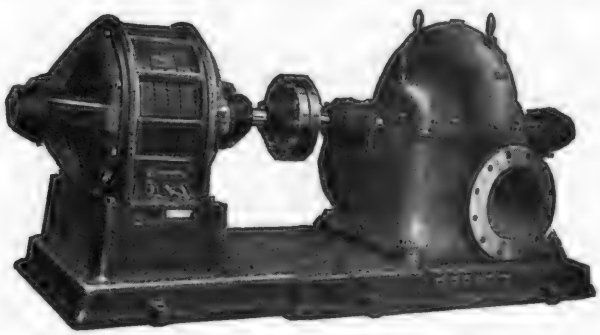
AMERICAN DISTRICT STEAM COMPANY

General Offices and Works
NORTH TONAWANDA, N. Y.

NEW YORK CHICAGO SEATTLE

Alberger Centrifugal Pumps

BELTED MOTOR DRIVEN TURBINE DRIVEN



We offer a complete line of Motor and Steam Turbine driven Pumps for general service under high or low heads, for boosting circulation in Hot Water Heating Systems, for Brine Circulation Systems, etc., where strictly high-grade apparatus is demanded.

ALBERGER PUMP & CONDENSER CO.

140 CEDAR STREET, NEW YORK

Boston Pittsburgh Chicago St. Louis Philadelphia San Francisco

STATEN'S

High Efficiency Sectional Steam Conduit

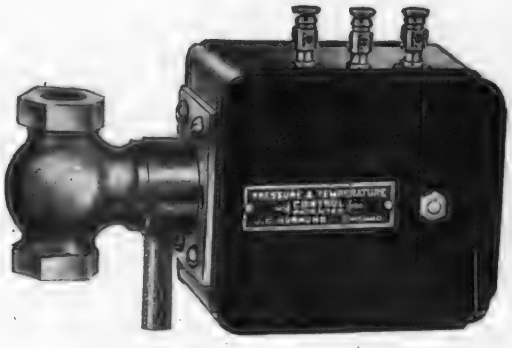
MEANS

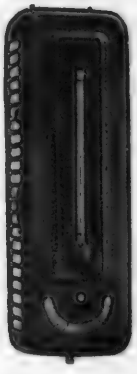
Low Cost
Ample Stock
Long Service
Prompt Delivery
Easy Installation

Complete Specifications and Estimates of Cost Furnished upon Request

UNDERGROUND SPECIALTIES CO., Inc.
1476 Broadway New York

Here is a Steam Pipe Conduit worthy of your notice. Made of thoroughly salt-glazed tile, especially made up in half sections, with roll-frame pipe supports and special conduit insulation installed by us complete, ready for steam pipes.





CONTROL *of* PRESSURES *and* TEMPERATURES *on* CENTRAL HEAT

is the ONLY WAY to compensate for the HIGH COST of production.

The HORNUNG MAGNETIC CONTROL

is designed to meet the above situation and a thousand others.

A request for circular, mailed today, will bring good returns

CENTRAL HEAT APPLIANCES

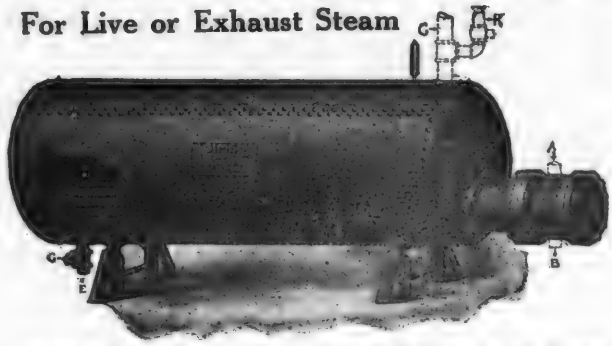
J. C. HORNUNG

343 South Dearborn Street CHICAGO

Sims Clean E-Z Steam Tube Heater

For Hotels, Apartment Buildings, Hospitals, Y. M. C. A. Buildings Schools, etc.

For Live or Exhaust Steam



requiring large quantities of hot water. This type of heater should be used in preference to circulating generator and storage tank—or instantaneous heaters.

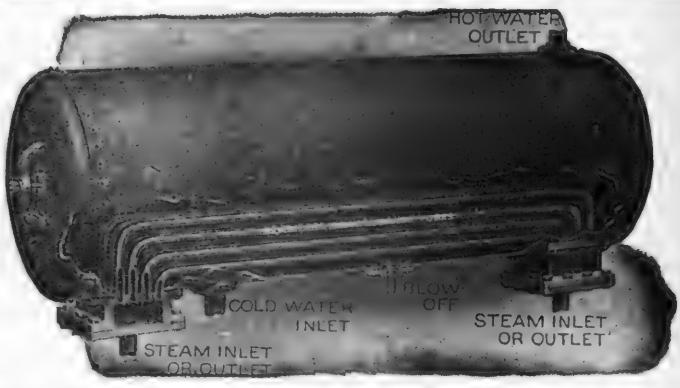
Special attention given to all kinds of water heating problems based on long experience in this work.

Valuable tables have been prepared, showing heater capacities using steam at various pressures. These tables are yours for the asking.

THE SIMS CO., 18th St., Erie, Pa.

PATTERSON

Hot Water - - - Service Heaters - - and Convertors



are the result of thirty years experience as water heating engineers. Each type meets certain requirements of hot water service and may be used with exhaust or live steam or in connection with low pressure, vacuum or vapor heating systems.

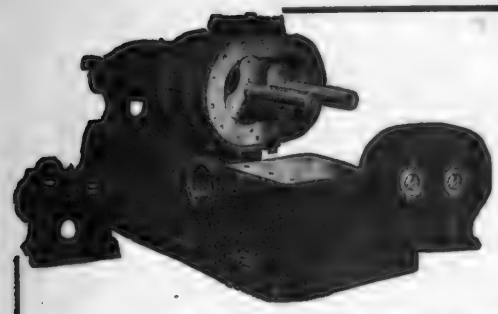
We offer the services of our engineers without charge and, when an installation is made in accordance with our recommendation, we positively guarantee that it will furnish all the hot water required for the specified purpose.

The individual requirements of each installation are considered before we make any recommendation as to the type or capacity of heater to be used. This analysis of local conditions enables us to determine whether storage capacity is desirable and, if so, to properly proportion it with the heating service to insure ***the maximum amount of hot water in minimum length of time.***

Send for our new catalogue.

Patterson-Kelley Co., 23 Dye Street, New York

Representatives in all Principle Cities.



Don't Make This Mistake

If you have made the mistake of installing a cheap, unsuccessful Rotary Pump, do not make the further mistake of concluding that all rotary pumps are worthless.

Instances of this kind have occasionally come to our notice and the "victim" is hard to convince that he would have had different results with the

Connersville Valveless Rotary Pump

This high grade Pump has been used for Vacuum Heating since 1908 in modern hotel, office, store, factory and other buildings in every state and city.

Ask for Bulletin 12H.

THE CONNERSVILLE BLOWER COMPANY
CONNERSVILLE, INDIANA

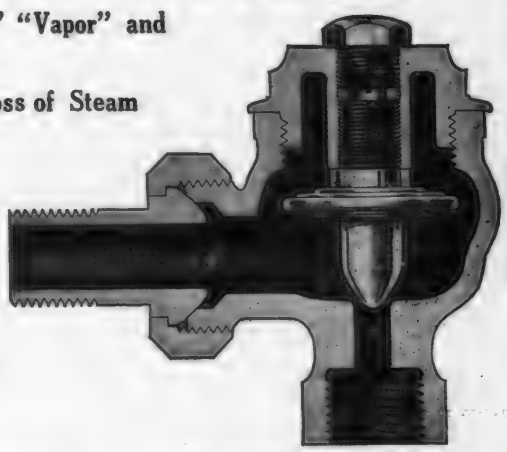
CHICAGO
929 Monadnock Block

NEW YORK
114 Liberty St.

Marsh Reflux Junior Thermostatic Traps

For Radiators and Coils of "Low Pressure," "Vapor" and "Vacuum Heating Systems"

Freely Discharges Air and Water Without Loss of Steam



THE Marsh REFLUX Return Line Trap is for use on the return end of radiators of low pressure, vapor and vacuum systems of heating. It is the result of a careful investigation into the actual requirements that must be fulfilled by a radiator return valve, in order that it may accomplish what is desired of it, namely, to free the radiator of air and water without the loss of steam and to do so noiselessly.

The Marsh Reflux Junior Thermostatic Trap is recommended for small radiators and coils. This Trap for the small and the Original Reflux for the large units will make an ideal job. Especially adaptable for two pipe gravity work and vapor systems.

May be furnished either outside adjustment (as illustrated) or with concealed adjustment.

Write for literature fully describing this trap.

JAS. P. MARSH & CO., 118-124 South Clinton Street **Chicago**

Established 1865

Manufacturers of Gauges for all Pressures and Purposes. Automatic Air Valves and Steam Specialties.

Cooling and Cleansing

of the Air used in the Ventilation of the

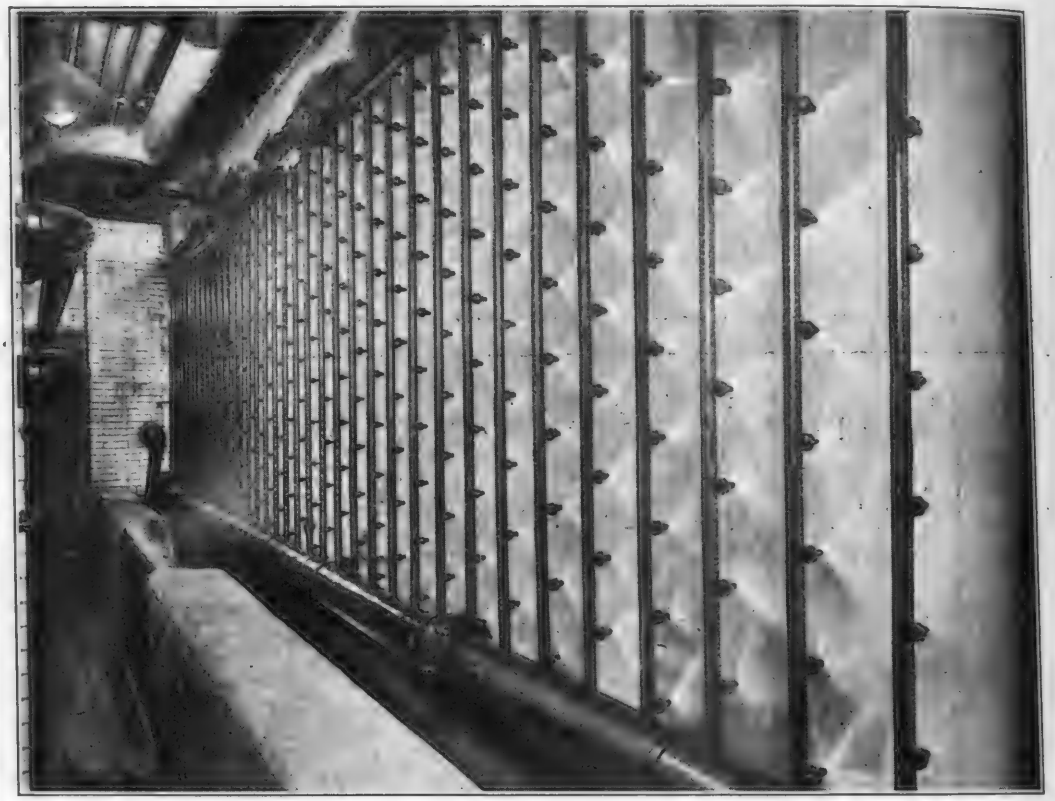
NEW GENERAL OFFICE BUILDING OF SWIFT & COMPANY

UNION STOCK YARDS, CHICAGO, ILL.

by use of a

WEBSTER AIR WASHER

should attract the attention of those interested



Spray Chamber—Swift & Company General Office Building

AIR CONDITIONING

for all classes of buildings

FRESH—CLEAN—COOL AIR

is essential to comfort and efficiency, whether applied to work rooms, schools, theatres, cafe's or hotels

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

In Industrial Plants

WHERE

Humidifying, Dehumidifying or Cooling

is Desirable for Automatically Maintaining
Certain Temperatures and Relative Humidity

Our Equipment is Unsurpassed

and during the 19 months in which the United States was at war was furnished for the following:

Food Products — Chemical — Steel — Zinc — Hardware — Electric Lamp — Smelting and Refining — Glue-Packing — Electric Storage Battery — Hat Manufacturers — Lithographing — Explosive and Municipal Plants.

Banks — Schools — Department Stores — Theatres — together with a Court House — Stock Exchange — Government Building — Cafe — Restaurant — College — Laboratory — Hotel — State Capitol and a Government Hospital.

The above, in addition to hundreds of installations during the preceding ten years

Our Engineering Ability

demonstrated by the great number of plants satisfactorily equipped, enable us to design and furnish the type of

AIR CONDITIONING APPARATUS

that will meet your requirements

BRAEMER AIR CONDITIONING CORPORATION

Lafayette Bldg., PHILADELPHIA

New York Cincinnati St. Louis Indianapolis Kansas City

Carrier Equipment Plus Carrier Engineering Service Assure Complete Satisfaction in Humidifying, Cooling, Heating and Ventilating

MANY of the failures or partial failures in artificial conditioning of buildings or industrial plants have been due to disregard of peculiar circumstances affecting the humidity of the building. One set of conditions is met with during cold weather, while an entirely different set is encountered in hot, dry weather. To be entirely successful the humidifying apparatus must meet both sets of conditions with equal ease. A very common error in the design of a humidifying system or apparatus is to assume that a room of one particular type with all its equipment, machinery or operatives may be taken care of in the same way and as easily as a vacant room. No greater mistake could be made. Apparatus that will work to perfection in a vacant room, or in a room of one particular type, may be an utter failure under trying conditions present in another room.

Carrier Air-Conditioning Apparatus is therefore furnished by us only after a most searching investigation by our engineers and preferably where we can do the erecting and deliver the installation ready for business.

Under these conditions we can and gladly do assume complete responsibility for performance. Carrier service includes ironbound guarantees which are all fulfilled before we ask a cent of pay.

42

Carrier Engineering Corporation

39 Cortlandt St., New York

Carrier AIR CONDITIONING AND DRYING EQUIPMENT

Chicago: Transportation Bldg.
Boston: 176 Federal St.
Buffalo: Prudential Bldg.
Philadelphia: Land Title Bldg.

Carrier AIR CONDITIONING AND DRYING EQUIPMENT

Health AND Efficiency

WOULD you expect an employee who is half sick or drugged to work at his maximum strength? Certainly not. But without fresh air constantly supplied, and the foul air continually removed, that is the existing condition.

There is only one way to accomplish the desired result,—Health and consequent Efficiency, and that is: Supply fresh air, cooled in summer and heated in winter;—and don't stop there, for fresh air soon becomes foul air and must be disposed of. This whole plan is termed: Positive Ventilation, and any scheme which does not accomplish these two fundamentals is a makeshift.

One of America's progressive organizations, Swift & Co., know this truth, and their office building in Chicago is equipped with a

Sturtevant (REG. U.S. PAT. OFF.) Positive System

This is described in detail in this magazine.

The foundation of this system is our Multivane Fan. We show a cut of the wheel or rotor from which it derives its name. You will note the curved blades which make an even distribution of air and makes possible the handling of a large volume of air with a minimum of power.

There are many more points to this question, which our Engineering Staff will gladly explain upon request.

B. F. STURTEVANT COMPANY
Hyde Park, Boston, Mass.
and all Principal Cities

TRADE TRANE MARK
WISCONSIN

Make This Profit Help Save Coal

It is easy to show factory managers how to save coal because most of them waste condensation to the sewer or run high boiler pressures and operate steam boiler-feed pumps. The Trane Automatic Electric Condensation Pump saves its cost in one year and takes little labor to install

Capacities up to 10,000 feet of radiation for boiler pressures up to 60 pounds. Shipped complete with motor. Can be installed in a few hours' time.

TRANE CONDENSATION PUMP

Make an inspection now of all factories near you. Find out if condensation is wasted or boiler pressure is run up to accommodate a steam pump. The fuel administration and the owner will both thank you.

The wonderful new Trane Master Pump has only one moving part, is not affected by dirt and pumps against high boiler pressures, if required.

Write today for illustrated circular

THE TRANE COMPANY

Main Office:
Box 832, LaCrosse, Wis.

Branch Office:
175 West Jackson Blvd., Chicago, Ill.

DISTRIBUTING AGENTS

Deringer Boiler Company,	Minneapolis, Minn.	Kelley-How-Thomson Co.,	Duluth, Minn.
A. Harvey's Sons Mfg. Co.,	Detroit, Mich.	Leighton Supply Co.,	Fort Dodge, Ia.
The Hunting Company,	Rochester, N. Y.	Mine and Smelter Supply Co.,	Salt Lake City, Utah
International Heater Co.,	Utica, N. Y.	Thos. Robertson & Co.,	Montreal, Canada
United States Supply Co.,	Omaha, Nebr.	Jackson Supply Co.,	Indianapolis, Ind.

Mercurial, Recording and Index Thermometers for all industrial and laboratory applications.

Electric Contact Thermometers.

Temperature Pressure and Time Regulators.

Mercury Column Vacuum Pressure and U Gauges.

Base Metal, Rare Metal and Radiation Pyrometers.

Fery Radiation Pyrometers.

Hygrometers.

Hydrometers.

Mineral Oil Testing Instruments.

Aneroid Barometers.

Mercurial Barometers.

Recording Barometers.

Pocket Compasses.

Surveying Compasses.

Rain Gauges.

Anemometers.

Air Meters.

Thermographs.

Hand Levels.

Aviation Barometers.

Inclinometers.

Sphygmomanometers.

Fever Thermometers.

Urinary Glassware.

Thermometers of all kinds for home and general use.

Tycos, the trade mark of an organization manufacturing indicating, recording and controlling Temperature Instruments of the *better* type, giving utmost satisfactory service; an organization that serves its trade sincerely in all dealings. The convincing proof of high quality of products is its growth.

Correspondence invited. We will do our best to give you the information desired, and not subject you to a long and mechanical series of follow-up letters.

Taylor Instrument Companies

Rochester, N. Y.

There's a Tycos and Taylor Thermometer for every purpose

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

Coal Must be Saved

Regulate Your Boiler to Carry
Greater Overloads

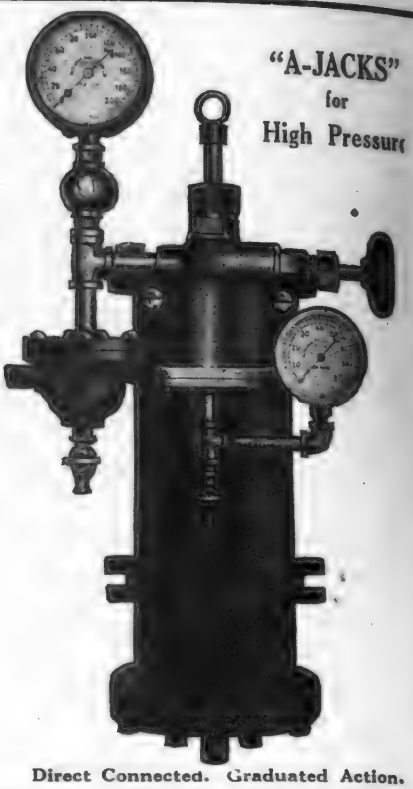
TRADE METAPHRAM MARK
REG. U.S. PAT. OFFICE

Steam Damper Regulators

High Pressure Vapor — Low Pressure Hot Water

Send for Prices and Circular

NATIONAL REGULATOR CO.
FACTORY AND GENERAL OFFICES
208-212 South Jefferson Street
CHICAGO



"A-JACKS" for High Pressure

Direct Connected. Graduated Action.

IMICO Heating Boilers

Smokeless

DOWN DRAFT

For Water or Steam

Our Catalogue describing our complete line of Heating Apparatus sent on request

ILLINOIS MALLEABLE IRON CO., Chicago

PRESSWELD RADIATORS

One-fourth the weight of cast-iron
Made of copper bearing sheets
Non-breakable Quick heating
More efficient
Occupy one-third less space
Smooth and sanitary

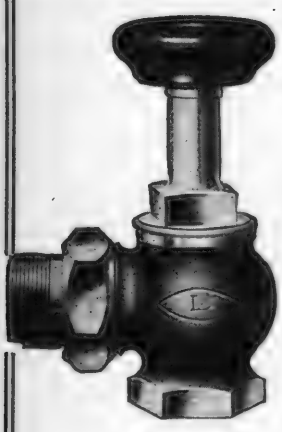
One piece from end to end

No mechanical joints

Our catalogue goes into details of construction, etc.

Equally adaptable for steam, hot water or vapor systems; gas and electric radiators; various types of refrigeration outfits; and as transformer and engine coolers.

THE AMERICAN PRESSWELD RADIATOR CORP., Detroit, Mich.



Good Luck Is a Matter of GOOD JUDGMENT...

Selecting the right kind of a Steam Radiator Valve is a matter of good judgment and may mean the difference between a perfect job of steam fitting and a defective system.

The Lavigne

Packless Quick-Opening Steam Radiator Valve

means dependable service and inspires confidence in your customers and makes every contract safe, sound and satisfactory. It safeguards your dealings and guarantees complete satisfaction. It holds the good will of your customers. ***Built Right to Stay Tight.***

ASK YOUR JOBBER

Commonwealth Brass Corporation, - Detroit, Michigan

TEMPERATURE CONTROL!

Everybody knows it is impossible to keep an even temperature by turning the steam on when it is too cold and closing it off when it becomes too hot. If you use

SARCO
TEMPERATURE REGULATOR

there is no need to watch your steam line or radiators.

Operated by hydraulic pressure developed within itself, this sensitive, 100% automatic and accurate appliance saves you such trouble and eliminates overheating or underheating.

Installation simplest possible. It is merely necessary to connect the valve in the steam line and hang the thermostat on the wall. It is also supplied on 30 days' trial.

Ask for Circular P-30.

SARCO COMPANY, Inc.

Woolworth Bldg., New York City

Ellicott Square, Buffalo
Drexel Bldg., Philadelphia
Williamson Building, Cleveland
New Telegraph Bldg., Detroit
and Representatives in all Principal Cities.
Canada, Peacock Brothers, Montreal
Monadnock Block, Chicago
Healey Bldg., Atlanta

It comprises a body, a cover and a thermostatic disc which is secured in the cover. There are no loose parts—no sliding contacts—nothing to gum up—nothing to obstruct the valve opening. It is made with special roughing-in measurements for the replacing of imitating devices.

A Little Device With a Big Job Ahead of It

The men of your profession are helping coal users by pointing out the sources of waste. They are condemning heating systems in which entrained air and water are permitted to stop the circulation of the steam. "Keep these obstructions out," they say, "and you will get more useful heat from your coal."

The simplicity of this message is equalled only by the simplicity of a device—the Dunham Radiator Trap—which has been doing these very things since 1903. It automatically relieves the radiator of the air and water, thereby permitting the steam to circulate freely at low pressure until all its heat is given up.

The DUNHAM HEATING SERVICE

C. A. DUNHAM COMPANY, Fisher Building, CHICAGO

Factories: Marshalltown, Iowa
Toronto, Canada

Branches in 36 Cities in United States and Canada

Inefficient Heating Systems in Old Buildings can be Remodeled at Comparatively Small Cost into Efficient WEBSTER Systems

NOW is the time to act in order to derive full benefit and economy for adequately heating buildings next winter, without carrying several pounds back pressure on the engines or using an undue amount of live steam.

From present indications, there will be a great scarcity of coal during the coming cold months. Prepare NOW to overcome this by installing the WEBSTER System.

At comparatively small cost and without extensive alterations or seriously impairing the operation of any department—the unsatisfactory heating system can be changed over in a short time into the efficient

Webster

Vacuum System of Steam Heating

Over 11,000 successful installations in all classes of buildings during the past 30 years. A large part of these were changed over from old heating systems. A return of from 25 to 50 per cent has often been realized on the investment required for changing over a poorly designed heating system into the efficient WEBSTER System.

The WEBSTER System provides perfect circulation of exhaust steam, live steam or a combination of the two through every radiator or pipe coil without appreciable back pressure on the engine, or noise, odor, air binding and other objectionable features.

We co-operate with the architect, consulting engineer, heating contractor or owner to help secure the best and most economical results at the least possible cost.

The Webster Guarantee is the Owner's Insurance Policy

Write TODAY for a copy of our Catalog V-37

Heating the Manufacturing Plant by the Webster System

WARREN WEBSTER & COMPANY

Webster Sylphon Trap for Radiator Returns and at Drip Points

MANUFACTURERS

Webster Systems of Steam Heating, Webster Feed Water Heaters, Webster-Lea Heater-Meters, Webster Steam and Oil Separators and Webster Steam Specialties

MAIN OFFICE AND WORKS

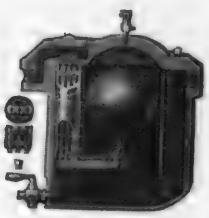
CAMDEN, N. J.

Branch Offices in 30 Cities

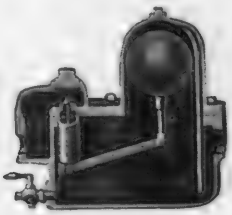
Fuel Conservation Specialists for Thirty Years

Standard with STEAM USERS SINCE '94

Wright-Austin products are guaranteed and anyone of our specialties will be sent you for a thorough trial. If you are not satisfied with it you can return it and we will stand the expense of freight both ways.



WRIGHT "EMERGENCY" HIGH PRESSURE TRAP



WRIGHT "VICTOR" LOW PRESSURE TRAP

WRIGHT "EMERGENCY" TRAP

Because it assures a constant flow of dry steam, the Wright Emergency High Pressure Steam Trap has been found invaluable for increasing the efficiency of heating equipment. It drains all accumulated condensation from steam lines, and does it without steam waste.

WRIGHT "VICTOR" TRAP

Large or small quantities of condensation, under absolutely no pressure, and up to 20 pounds, are discharged through one large valve by the "Victor" Trap.

Send for copy of the Wrigh-Austin catalog. It has pages of facts on Traps and their operation—a copy free at your request.

WRIGHT-AUSTIN COMPANY

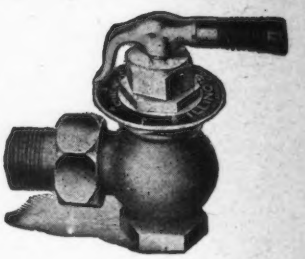
Detroit, Mich., U. S. A.

Branch Offices:

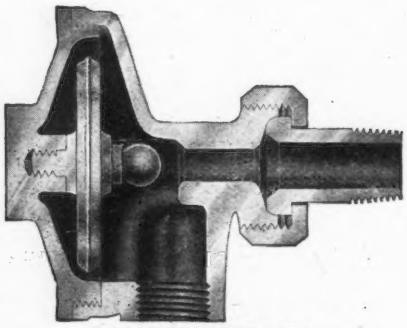
New York Atlanta Chicago

Representatives Everywhere.

ILLINOIS
HEATING SYSTEMS
Vacuum -:- Vapor -:- Modulating



Installed in thousands of buildings from coast to coast, containing millions of sq. ft. of radiation. Backed by nearly 20 years' successful use.



ILLINOIS THERMO
The Original Vertical Seat TRAP

We manufacture the most complete line of

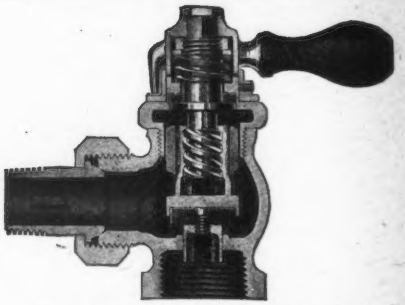
STEAM HEATING and POWER PLANT SPECIALTIES

on the market

Illinois Engineering Co.
Racine Ave. at 21st St., CHICAGO
Branches in 20 cities

You are not experimenting when you specify the

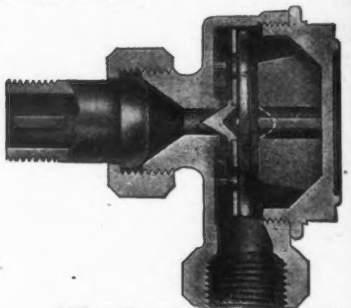
McALEAR SYSTEM



McAlear Packless Graduated Valve not only the handsomest graduating valve, but the simplest and of the best construction of any valve on the market.

The McAlear line of Heating Specialties embodies the experience of 25 years in the science of vacuum and vapor heating.

Send for list and description of all classes of buildings in which the McAlear System is being successfully operated.



McAlear Perfection Radiator Trap will close tight against a steam pressure of 50 lbs. when discharging direct to the atmosphere, or into a vacuum of from 1 to 25 in.

McALEAR MFG. CO.
223 West Erie St., Chicago, Ill.

Not All Junk! *Look Again.*

"JUST JUNK," you say. That is where you are wrong, friend. True the car is loaded with material cleared away for the new Union Station, Chicago, material which has been in service from ten to forty years, with that Cast Iron Pipe for the longer period.

"Junk!" You're right; all that other material is junk and not worth much; but that

Cast Iron Pipe Is As Good As New

and, what is more, it is worth more today than its original cost.

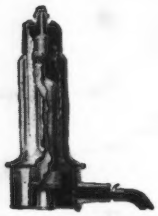
"Looks Rusty." Sure it does, and sure it is that it is that surface rust which, by excluding oxygen, prevent combustion—rusting is but slow combustion, you know—and thus enables CAST IRON PIPE TO GIVE SERVICE MEASURED BY CENTURIES.

Junk? Not much! That pipe is the stuff that makes an initial investment a permanent one.

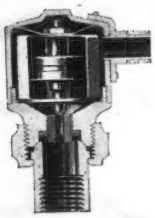
SERVICE CAST IRON PIPE MEASURED BY CAST IRON PIPE CENTURIES

The Cast Iron Pipe Publicity Bureau
1 Broadway New York

HOFFMAN VALVES

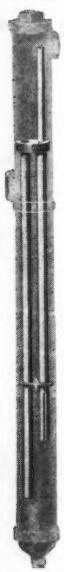


No. 1 Hoffman Siphon Air Valve Use for Gravity Jobs



No. 3 Hoffman Air Line Valve Use for Air Line Drip or Vacuum Jobs

No. 5 Hoffman Quick Vent Float Air Valve Use for Vapor or Quick Vent Service



Hoffman Equalizing Loop

There is a Valve for Every Service

in the

Hoffman Line

HOFFMAN Venting Valves are the culmination of 35 years of intensive work in this line and we know by test that each Hoffman Valve is the best in its particular class.

Guaranteed for five years to be an operative device in the service.

Non-adjustable.

Order them today from your jobber.

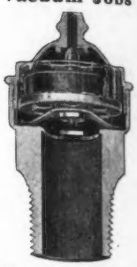
Hoffman Specialty Co.

130 No. Wells St., Chicago, Ill.

Los Angeles, Cal.
215 West 7th St.

New York
512 Fifth Ave.

No. 2 Hoffman Siphon Air and Vacuum Valve Use for Gravity Vacuum Jobs



No. 4 Hoffman Junior Quick Vent Air Valve Use for Quick Vent Service on Mains or Blast Coils

No. 6 Hoffman Quick Vent Float, Air and Vacuum Valve for Vapor Vacuum Quick Vent Service